THE JOURNAL OF GAS LIGHTING
WATER SUPPLY & SANITARY IMPROVEMENT

VOL. LXXII. No. 1852.] LONDON, NOVEMBER 8, 1898. [50TH YEAR. PRICE 6d.

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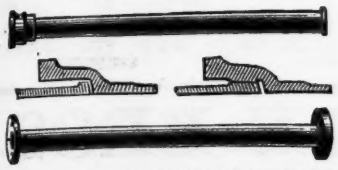

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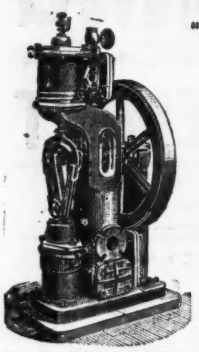

Fig. 703. "SINGLE RAM" STEAM-PUMP.

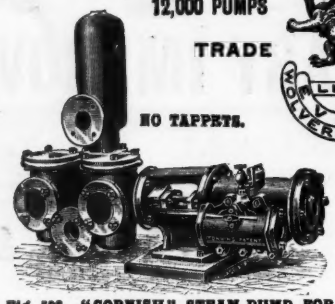

Fig. 808. "CORNISH" STEAM-PUMP FOR BOILER FEEDING, &c.

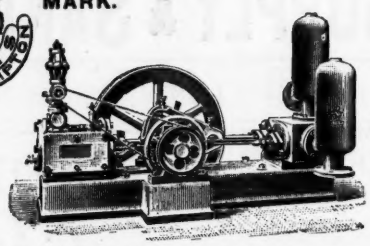

Fig. 665. "RELIABLE" STEAM-PUMP FOR TAR AND THICK FLUIDS.

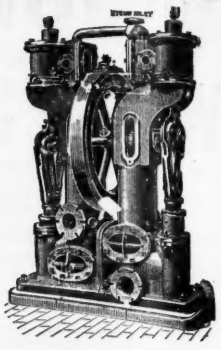

Fig. 712 "DOUBLE-RAM" STEAM-PUMP.

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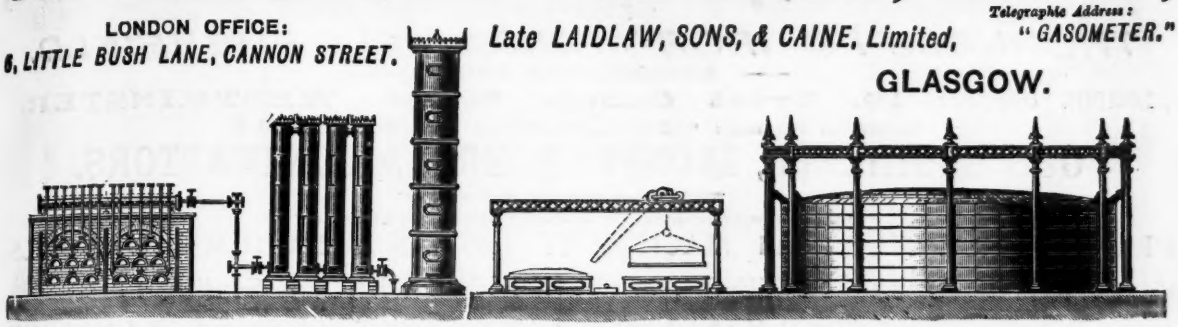

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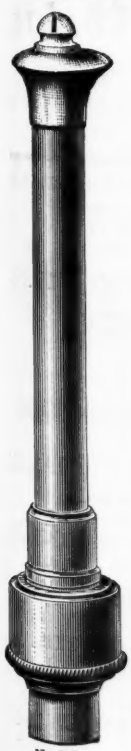

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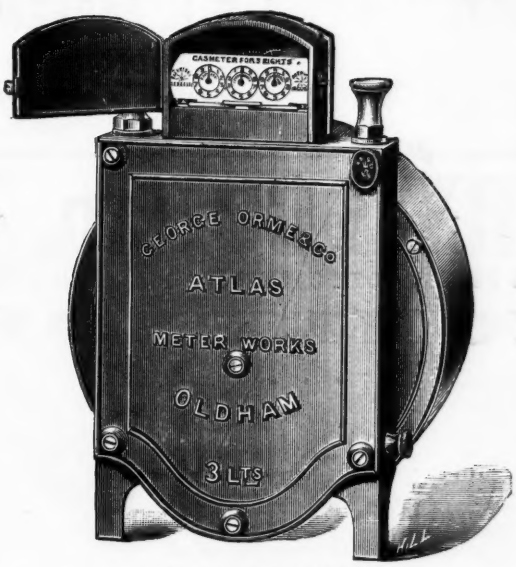

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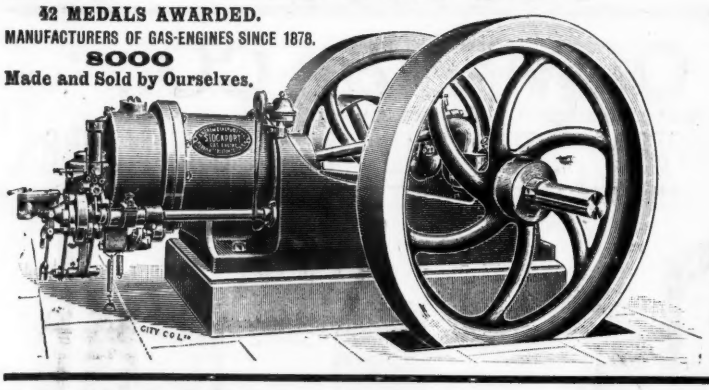

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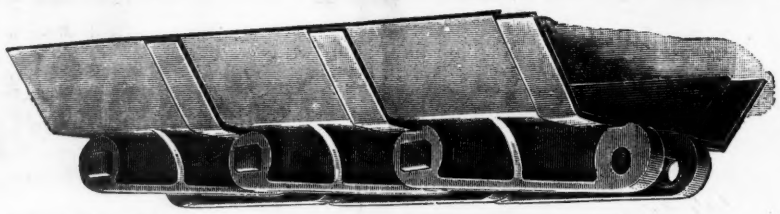

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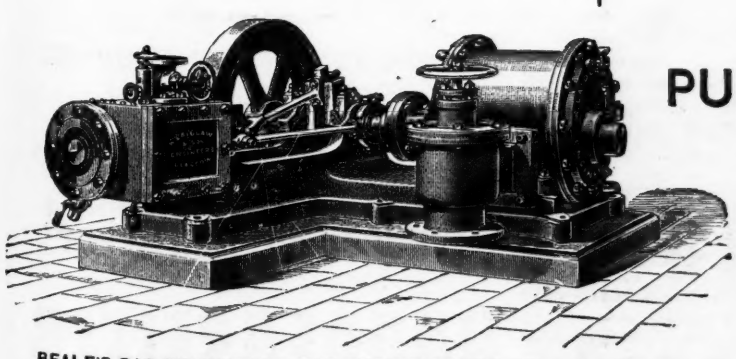

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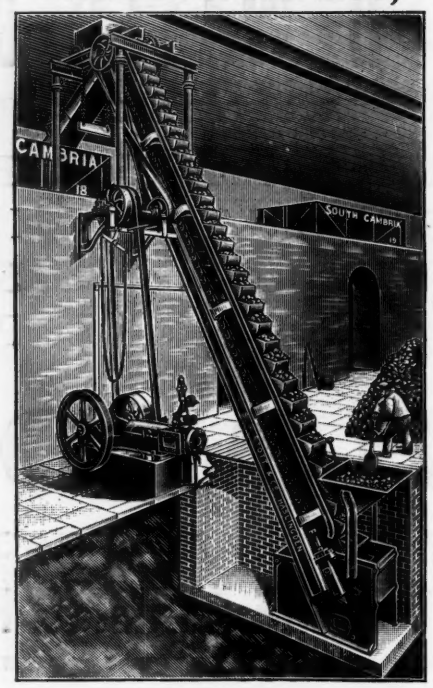

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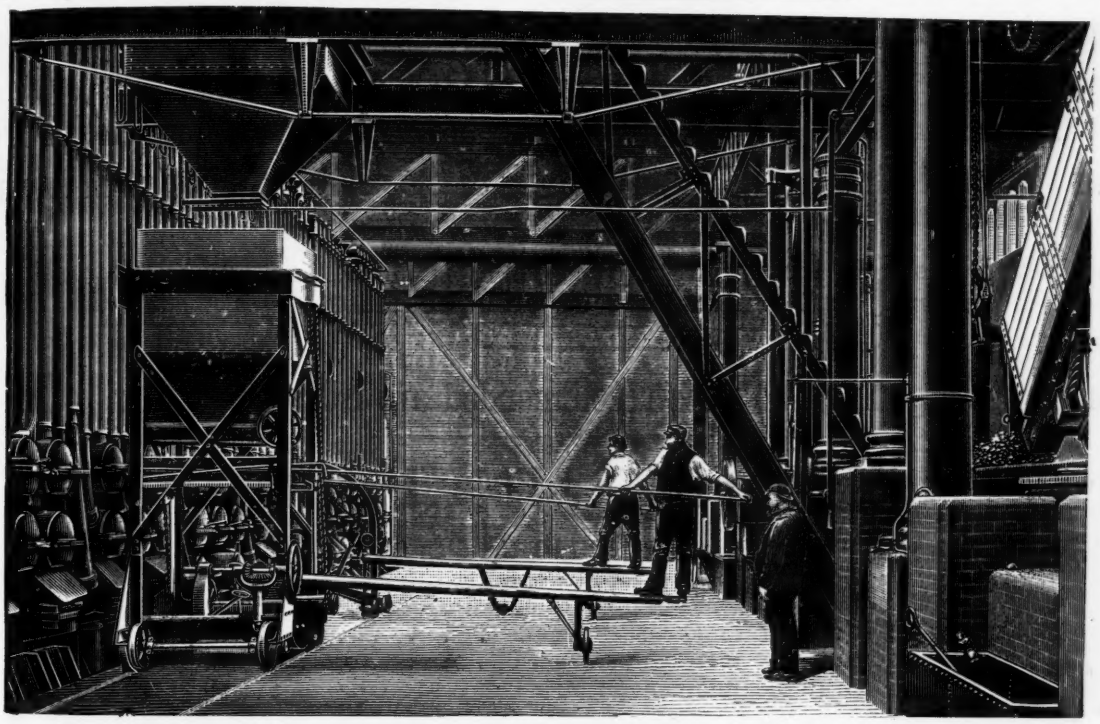

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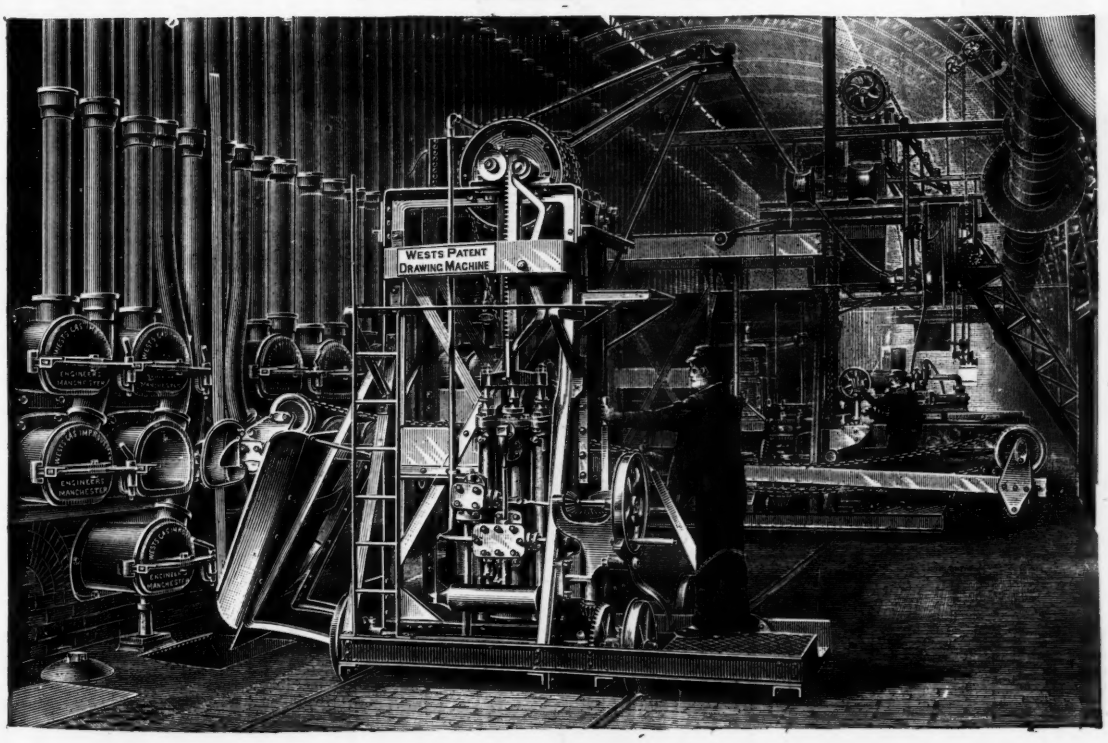

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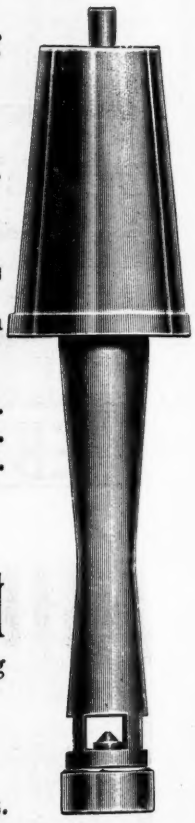

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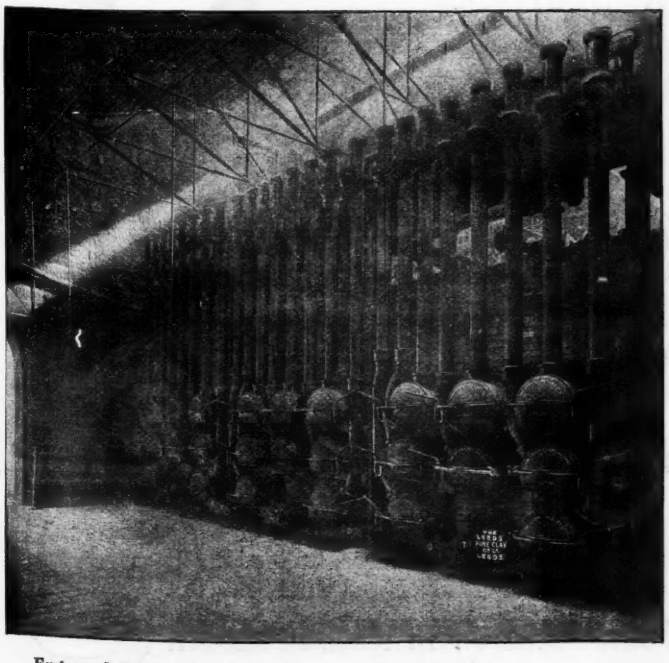

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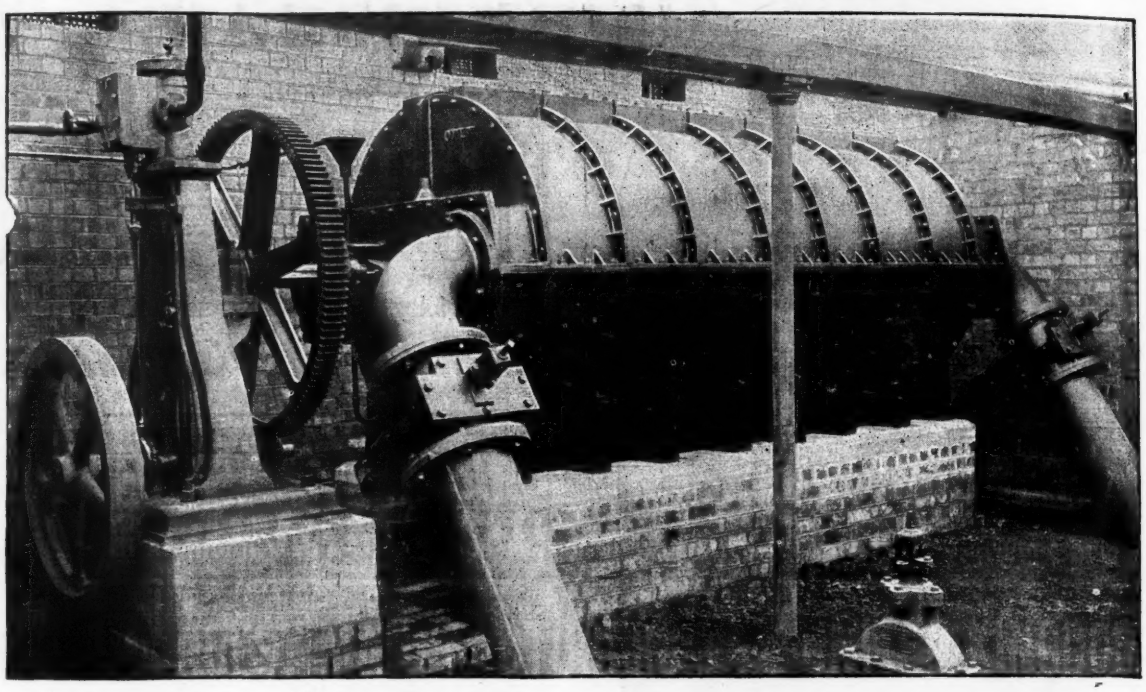

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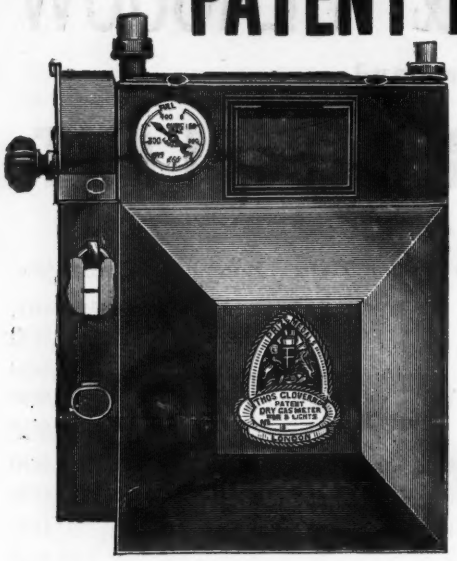

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EDITORIAL NOTES.

The Award in the Morley Arbitration—The Hard Case of Malvern.

As reported in last week's "JOURNAL," Mr. James Mansergh, the Umpire in the Morley arbitration, has awarded the Company the sum of £109,866 as the transfer value of their undertaking according to the terms of the Act. In commenting upon the proceedings before the Arbitrators, on the 4th ult., we recorded the data upon which they were asked to appraise the property. The Company made it out to be worth £133,688; while the case of the Corporation was that it was not worth more than £80,000. We remarked at the time that there ought not to be much difficulty in striking a fair balance between these claims, and have no hesitation in characterizing the award as satisfactory. The amount given is nearly 33 years' purchase of the last dividend; but, of course, this is only a rough-and-ready way of stating the result. Nobody knows what the Umpire took as the maintainable profit, nor the allowances for and against the undertaking which he felt to be necessary in the circumstances. If there were any "Golden Rule" discernible in such negotiations, arbitrations would no longer be necessary; and this would be a pity. It is one of the chief beauties of our arbitration arrangements that they always leave the main question open to be decided in the same way for every case as it comes along.

If the Morley arbitration and award are noteworthy as an example of a plain, straightforward instance of compulsory valuation of a gas undertaking for transfer to the Local Authority, and no nonsense about it on either side, so much cannot be said of the proceedings in the Malvern Link arbitration, reported in another part of the "JOURNAL" to-day. The arbitration took place last week, before Mr. Shiress Will, Q.C., as the Umpire, with Mr. Corbet Woodall as Arbitrator for the Company, and Mr. Charles Hunt for the Great Malvern District Council. It was perhaps a providential circumstance that the Umpire was a lawyer, inasmuch as the chief interest of the proceedings ultimately centred in a point of law of an unprecedented character. The facts of the case are somewhat complicated. Up to the present year, Great Malvern and Malvern Link have been adjoining, but distinct and independent, local government districts. Great Malvern had its own gas-works, under an Act of 1851, amended in 1858, whereby the gas limits were extended to include the parish of Leigh, in which the small township of Malvern Link is situated. These powers were never exercised, so far as to supply the Link; and in 1861 a Gas Company for this purpose was formed, and carried on business without statutory powers until 1896, when it was decided to apply for parliamentary sanction for the undertaking. Meanwhile, the Link had arrived at the dignity of having a District Council, and the Council desired to take over the gas supply. An agreement to this effect was arrived at between the parties; when Great Malvern suddenly awoke to the consciousness of its dormant statutory powers of supply over the Link region, and wanted to get effective control of the whole business. Both Councils went to Parliament, and there fought hardly for the body of the Link Gas Company; the Link Council proving victorious. All this is written in our parliamentary records. But having obtained their statutory powers, the Link Council hesitated about going forward to the next step, that of arbitration, for reasons with which the other party—the Gas Company—had nothing to do. Previously, the Link Council and their constituents had entertained a strong affection for their state of local autonomy, and wished for nothing less than fusion with their bigger neighbour. Influences arose in the course of the past year to modify this attitude; and accordingly one fine morning Malvern Link, as an independent local government area, ceased to exist by virtue of an order of the Worcestershire County Council, transferring the district to, and merging it with, the neighbouring district of Great Malvern. This amalgamation seems to have been carried through so quietly that the Gas Company were never disturbed in their placid attitude of waiting to be bought by the Local Authority.

When the business was once more gone into, however, it was the Great Malvern District Council, and not the Malvern Link District Council, who faced the poor little Malvern Link Gas Company, Limited, before the arbitration

tribunal; and the Great Malvern Council put forward their old statutory powers as constituting an element in the case! Mr. Newbigging, for the Company, asked for £25,457; basing the claim upon 26¾ years' purchase of the maintainable profits. Mr. Newbigging's valuation was supported by Mr. H. E. Jones; and Mr. J. Gould, the Manager of the Company, testified to the good condition of the works and the prospects of the undertaking. Upon this case, Mr. Balfour Browne, Q.C., for Great Malvern, sprang the objection already mentioned, of the competing powers of the District Council which, legally speaking, knocked the maintainable profits down to zero. Counsel admitted that the multiplier might nevertheless be put at 22 years; and he seemed to allow that the valuation put upon the property by his own experts—Mr. W. A. Valon and Mr. Alfred Colson—amounting to £18,462 might stand. It is only fair to the professional gentlemen engaged, not the lawyers, to record that they did not say a word in support of the legal quibble. Mr. Valon's valuation was quite independent of this contention, upon which Mr. Fitzgerald poured the vials of his contempt and scorn. Mr. Balfour Browne, of course, acted upon his instructions in raising it; and being pressed by his learned friend on the other side, asked for a special case, in which application Mr. Fitzgerald concurred. It is an attorney's point, all over; but it is not for us to offer any opinion as to its legality whatever we may think of its morality.

The Affairs of the Imperial Continental Gas Association.

THE half-yearly general meeting of the Imperial Continental Gas Association was held on Tuesday, Mr. T. H. Goodwin Newton in the chair. The report of the Directors is completely satisfactory, and admirably calm in tone. Nobody reading it would receive an impression that the administration had passed through a period of exceptional trial—not to say "storm and stress." Yet the moment the Chairman began to speak, he could not help touching upon matters of the very gravest interest. The Association appear to be finding in Berlin some compensation for Amsterdam and Vienna. Not that the Association depends for its future upon any one city or commune, however large; it being a gratifying feature of the present situation that gas is going farther into the recesses of Hungary and Bohemia than would have been possible only a very few years ago. The Amsterdam undertaking passed out of the possession of the Association on the 10th of August last, when the Corporation took it over, paying the agreed net price of £1,330,000. It is instructive, in view of the practice of gas-works municipalization in this country, to take note of the conditions of the Amsterdam transfer. During the fifteen years of their Amsterdam contract, the Association expended upon the undertaking a capital sum of £1,280,000. This has been repaid by the Municipality, with £50,000 to the good; but in addition the Association have realized the amount of the depreciation fund formed during the existence of the concession, which is £340,000. Thus there was a capital profit of £390,000 upon the Amsterdam connection; and the Directors have decided to deal with the mobilized funds according to their usual wise business policy. It is only what was to have been expected of the Directors, but is nevertheless to be recorded in their honour, that in settling the Amsterdam affairs of the Association they remembered the officers and workmen who had served them so long and well. As to Vienna, Mr. Newton spoke very circumspectly. A settlement of the difficulty with the Municipality has been arrived at, thanks to the unwearied and skilful diplomacy of Mr. Lindon and Dr. Teltscher, supported (although the Chairman did not mention it) by the good faith of the Board. Before the meeting ended, steps were taken on behalf of the proprietors to mark their appreciation of the services rendered by the Directors to the Association during the last two troublous years.

Cases under the Workmen's Compensation Act—The "Prepositions."

TAKING up the story of the interpretation of the Workmen's Compensation Act from where we left off last week, it is to be noted that his Honour Judge Collier has decided in favour of the plaintiff the reserved case of the builders' carman killed by a fall from a timber cart standing in the street outside the defendant's premises. It was argued against the claim that an accident occurring in a public street cannot be said to arise upon the employer's premises. This question of location, or as one might say of the range of "factory" employment, is admittedly of the very utmost seriousness. It is essential for the right interpretation of the Act that the closest study should be given to its wording. As we have already had occasion to remark, employees must be warned against the natural propensity to paraphrase the language of the Act. As regards this particular order of questions, the Act defines the employments to be those "on or in or about a railway, factory, mine, quarry, or "engineering work;" and so forth. It is clear that these prepositions are susceptible of widely differing interpretations, according to the circumstances. It is not the way of English law to schedule applications, but only to lay down principles. If it is not presumptuous, we desire to remark that Judge Collier has decided this particular case in the sense we fully expected. Employers may as well make up their minds to accept the general rule that, when their establishments are included within the scope of the Act, it will be extremely difficult to cut any man upon the pay-roll out of the benefits conferred by it by construing the prepositions of section 7. Light upon the point is also thrown by the adverse decision of Judge Addison in the Southwark County Court, mentioned last week, upon the claim of an "overside" workman. The man claimed because he was working on the off-side of a vessel moored to a quay, which is a "factory" within the meaning of the 1878 to 1891 Acts. Unfortunately for him, none of these, nor the principal Act, mentions "ship" among the applications. The word "factory" does not include "ship;" but it does mean "dock, wharf, quay," among other things. Hence we get the apparent anomaly that a man who may be working on a wharf, and so discharging a coal cargo, comes under the protection of the Act; while another man discharging part of the same cargo into a lighter on the other side is not so protected. The anomaly, such as it is, is intentional. The line must be drawn somewhere. As the Chairman of the Liverpool Steam Shipowners' Association points out in a letter in "The Times," there is not a word in the Workmen's Compensation Act about ships or sailors. Quays—yes; but ships—no. Many a case will crop up to test the ingenuity of the Courts in drawing this and similar distinctions. Meanwhile, our readers may rest assured that where a gas-works is a factory, there is no saying off-hand where the factory boundary lies, so far as the Act is concerned. And it will perhaps be as well to repeat that the word "factory" here means "any premises "wherein or within the close or curtilage of which steam, "water, or other mechanical power is used." According to this definition the presence of a steam-boiler, although only used for blowing out pipes or utensils of manufacture, constitutes a gas-works a factory, and consequently brings it within the scope of the Act.

Mr. W. H. Preece on Street Lamp-Posts.

SOME of the amazing utterances of Mr. W. H. Preece, in his Presidential Address to the Civil Engineers, are dealt with in our "Electric Lighting Memoranda" this week. Among other ineptitudes, the speaker inquired what could be "more inartistic than a lamp-post"—as though these necessaries of civilized towns were all of one pattern. It is not the object itself, whether it is a lamp-post or anything else, that is "artistic" or the opposite; the word employed by Mr. Preece being only an adjective. His language is very loose in this and other respects, which would spoil a Presidential Address otherwise instructive and interesting. After what has been advanced of late in the London newspapers with regard to the spoiling of Waterloo Bridge by the London County Council's lamp-posts, it is very disheartening to find so important a subject handled so poorly by the nominal head of English engineering science. Mr. Preece may be a good electrician, even though he does not know the difference between an adjective and a noun; but he is evidently not a man to speak after as regards the possibilities of street-lamps as aids to street embellishment. We have implored architects time and again to offer some guidance to the world in this matter; and perhaps the echoes of Mr. Preece's Philistinism may now rouse them to speak on the subject of street amenities in general and of lamp-posts in particular.

Depression of the Chimney Sweep's Trade.

THE statement which we reproduced last week, that the trade of the chimney sweep in London is suffering severe depression in consequence of the growing popularity of gas cooking-stoves, is exactly the kind of thing to excite the interest of the reporters for the cheaper newspapers. It

consequently was not surprising to find at least two of these journals published in London coming out with "interviews" with leading professionals in the chimney sweeping line, purporting to give the "inside" view of the alleged failure of the sweep's trade. This, we allow, is a most admirable proceeding; for to the wise observer of his times, the business interests of a sweep are quite as noteworthy as the ceaseless cackle about Art and artists which fills so many newspapers and even books of the day. Why should not one class of wielders of the brush enjoy as much free advertisement as another? True, a chimney sweep may not aspire to become a Royal Academician; but, on the other hand, many a painter not unknown to Burlington House would probably have done very much better with the brush which knows only one pigment—pure carbon. This, however, is a sadly impertinent digression. The point is that the chimney sweep nowadays hardly gets enough soot to keep him in his usual countenance. One reporter who undertook to investigate this matter seems to have fallen into poor hands. He looked up the Secretary of the Master Chimney Sweepers' Society, and inquired this gentleman's views of the situation, but found nothing better worth setting down than a tradesman's grumble against low prices and "underselling." Gas-stoves? Not much to complain of. A few years ago gas-stoves came in and threatened the sweeps with beggary; but the official opinion was that "30 per cent. of domestic gas-stoves have gone "out of use." If this is the fond delusion of the London Master Chimney Sweepers' Society, the sooner the truth is realized the better. Outside practitioners whose experience is reported in the "Evening News," know what is the matter. The prepayment gas-stove, the oil-cooker, and the larger gas-kitchener combine to render summer chimney sweeping a scarce employment; but the winter still makes amends. We wonder, by the way, that our modern humanitarians, who are so fond of looking after cases of lead poisoning and "phossy jaw," and who would give worlds for a good reliable case of zymotic disease properly chargeable against one of the London Water Companies, do not investigate the phenomenon of the prevalence of cancer among the chimney sweeps. Chimney sweeping is in this respect a more dangerous trade than many occupations catalogued as such; but nobody seems to mind—there is no Trade Union sentiment or political interest in this connection. But it can scarcely be contended that chimney sweeping is one of those avocations the disappearance of which before the advance of modern material civilization, represented by the gas-stove, is greatly to be deplored.

Sir H. H. Fowler's Rules for Municipalization.

Sir H. H. Fowler, M.P., has been speaking at Wolverhampton upon public affairs, and utilized the opportunity for saying a few wise words upon a subject which concerns Wolverhampton neither less nor more than other populous places—the question of the extension of municipal powers and responsibilities. A quarter of a century ago, as the speaker remarked, Municipalities in general did not trouble themselves about many of the things that are now supposed to belong to their province. The whole subject of the expediency of the municipalization of public services is not an easy one, as Sir Henry Fowler admitted, though many people are quite ready to dogmatize upon it in one way or another, as though it were perfectly simple. Certain departments of public work can undoubtedly be municipalized with advantage, and certain other necessary public services cannot satisfactorily be carried out except in the public interest and under public control. On the other hand, Sir H. Fowler asked his hearers not to forget "that in private enterprises controlled by experienced and "competent administration, carried out under the super-"vision of those whose whole temporary interests are "bound up in their success and development, there lies "the basis of our commercial life and our commercial "progress." The speaker would not attempt to draw the line between municipal and private enterprise. Nobody could do so with success. The fundamental question of "expediency" lies at the root of all such problems; and this is really a question that can only be answered in particular cases. Thus, for instance, Sir H. Fowler mentioned the lighting of a town as one of the services which the public authority can properly undertake; but nobody knows better than he that there is no general law under which such a service can be municipalized. Indeed, he laid very particular stress upon the consideration that any case for municipalizing a public service must rest upon proof not only that municipal enterprise could "do the thing more efficiently, but they must "be prepared to do it more cheaply." We thank thee, Sir Henry, for this particularly neat expression of the principle. Municipalities, he said, have "no right to any control, and "Parliament has no right to grant any power, which "would deprive the ordinary citizen of his undoubted "right to buy in the cheapest market." This is the reason why some gas undertakings will never be municipalized. But this is by no means all. Sir H. Fowler went on to lay down the further rule that "municipal enter-"prise should be so assuredly reproductive that it "could be carried on without entailing loss on the rates." This was Rule Two. Rule Three was what we have always contended for in these columns. The municipalized service must in equity be rendered at cost price. "If they charged higher for any article produced by public "enterprise than the cost of producing that article, they "were taxing the consumer; and if they charged lower "than the cost, they were taxing the general community." The speaker specifically mentioned gas supply as furnishing an illustration of the bearing of this principle; but he shrank from driving home his own declaration of principle, as "two of the greatest cities in the North of England "had taken precisely different lines with reference to it." Here the politician overawed the economist.

WATER AND SANITARY AFFAIRS.

The extraordinary drought of the past summer having prevented the East London Company from maintaining the constant supply in their district, the London County Council have resolved to go to Parliament for power to buy up the Companies and to introduce a fresh supply from Wales. In the Purchase Bill, there is to be a clause authorizing the Council to connect the mains throughout London, so that every district shall be able to draw upon the common supply. Of course, if the Purchase Bill fails to pass, the Council will not be in a position to connect the mains and secure one supply for all London. The East-end, therefore, is dependent on the passing of the Purchase Bill for the introduction of the remedy which the Council have devised for the prevention of any future deficiency in the supply. Thus the East-end trouble is made the foundation of a big scheme, involving the expenditure of millions, instead of a Bill to deal with the East London question by simply providing that if the Companies do not voluntarily connect their systems they shall be compelled to do so. As a matter of fact, the Companies do not require compulsion; but the Council take no note of this circumstance—preferring to raise a cry that the so-called water famines will never end unless all the undertakings are united under one authority. And it is further asserted that all London may perish for want of water unless a supply is brought from Wales. So the pyramid is made to stand upon its apex, and a local and temporary deficiency of supply, the repetition of which is now being effectually guarded against, is brought forward as an irrefragable argument for getting rid of the Water Companies, and laying an aqueduct from Wales to the Metropolis. The people of East London have little to thank the Council for; but the Council have reason to thank East London for furnishing a plausible pretext wherewith to precipitate what is called the settlement of the water question. The Royal Commission has been blamed for delay; but Lord Onslow states that Lord Llandaff promises there shall be a report from the Commission on the subject of linking the mains in time for legislation in the coming session. The sittings of the Royal Commission were resumed yesterday, when a fresh aspect was given to the case; Mr. Pope, Q.C., announcing that the Companies were themselves prepared to introduce a Bill (of which he gave the leading particulars) for connecting the different systems of water supply. Mr. Ernest Collins stated that the cost of carrying out the scheme would be about £307,000. Lord Llandaff observed that the President of the Local Government Board would certainly expect the Commission to lay before him some criticism on the proposals which the Companies set forth in their Bill, as specified by Mr. Pope. He also thought that the Board would be prepared to bring in a Bill of their own, or that possibly they would adopt the measure

proposed by the Companies. In any case, they considered immediate legislation necessary for connecting the different works.

The fact that certain Moderates have gone over to the Progressive side on the subject of the water supply, says nothing as to the real merits of the case. The heat of a debate and the clamours of the Press may be fatal to the exercise of a sound judgment. But the entire Press is not agreed to support the Council in proceeding on the extravagant career proposed by the Water Committee. Naturally, the Progressive organs are jubilant; and the vote of Tuesday last appears to them a token of speedy victory. "London" declares that "nothing can now "upset or indefinitely postpone the policy of purchase, or "the completion of the scheme by introducing a supple-"mentary supply from Wales." The members of the Royal Commission are expected to be duly impressed; and it is thought that the Government will be glad to leave the water question in the hands of the Council. The vote of 101 to 15 really settles everything. This "phenomenal majority" excites the "Daily Chronicle" to ecstasy. If the Companies are able to offer effectual resistance in Parliament, then the Council are advised to drop their Purchase Bill, and throw their energies into a demand for a Welsh municipal supply. The word demand is used "advisedly." If Parliament obstructs the policy of the County Council, it will be possible, we are told, to raise such an agitation in London as no Government dare resist. But there are other voices to be heard than these. "The Times" gives warning against hasty and ill-advised legislation, and points out that the deficiency in the rainfall has been such that the amount of water withheld from the Thames basin by the drought is equal to a nine years' supply of London at 31 gallons per head. Mr. Dickinson's harangue in support of the recommendations of the Water Committee is described by "The Times" as a panic speech and by the "Pall Mall Gazette" as an admirable piece of special pleading. Mr. Dickinson went so far as to say that the resources of the Southwark and Vauxhall Water Company were rapidly coming to an end, and the West Middlesex Company were admitting that they required further powers in order to give an efficient supply. But the exhaustion of parliamentary powers is not equivalent to the drying up of the Thames. On this subject, a good deal of nonsense is being spoken and written, and predictions are freely uttered that the Thames is in danger of becoming a mere tidal ditch. Lord Farrer has written to "The Times" giving figures to show that the river is now undergoing a process of exhaustion. It is said that figures can be made to prove anything; and certainly there has been no other evidence during the past summer that the Thames was in a bad way, except sundry calculations resting on a doubtful basis.

The real bearings of the water question are largely obscured by an attempt to show that those who take a reasonable view of the subject are defending the Water Companies. This kind of charge is levelled against Mr. Chaplin and the Government, as well as against parties less eminent. But if defence is offered, it is because of an attack. Mr. Shaw Lefevre has written a long letter to "The Times," in which he virtually warns the Companies to agree with their adversary quickly, on pain of making a worse bargain at some future time. What kind of bargain Mr. Shaw Lefevre has in view, is shown by his notion of arbitration, which is to take into account the present and future obligations of the Water Companies, the actual condition of their works, and many other questions affecting them "peculiar to the case of London." If the present Government refuse to favour the Council in this matter, there is hope that a future Administration will be "more "in sympathy with the Council, and less favourable to "the Water Companies." With Mr. Shaw Lefevre again in authority, we know what may be expected, so far as his influence will extend. That the Companies will resist purchase to the death, is only true so far as relates to something which is called purchase, but which is in reality spoliation. To fair and reasonable terms, as Mr. Boulnois has intimated, the Companies will not object; and Sir Arthur Arnold has expressed his opinion that the opposition of the Companies to a fair system of purchase would be merely perfunctory, and would not be a "tooth-"and-nail" opposition, as had been asserted. Then why this fiery antagonism to the Companies? Against what were the Progressives launching their thunder on Tuesday? What was it that so roused the volcanic ire of Mr. Burns, some of whose remarks were scarcely within bounds? If the future is so dark for the Water Companies, it is curious that Mr. Shaw Lefevre's friends should be so anxious for early purchase. They must buy up the Companies; and it must be at once. They have raised an agitation, and must strike the iron while it is hot, or they fear it will get cool. Perhaps they have some dread of the coming report of the Royal Commission, which, after all, may arrive too soon to suit their purpose. Already they shrewdly suspect that the report will not altogether harmonize with their plans and purposes. However, as the case stands, there is to be a fight in Parliament next session. Having spent some £40,000 of the ratepayers' money in promoting or opposing Water Bills, the Council are now going to spend something more. If London wants to buy up the Water Companies, it can do so. But do the Council properly represent London? If the ratepayers looked more keenly after their municipal interests than they are in the habit of doing, London might have a different County Council.

ESSAYS, COMMENTARIES, AND REVIEWS.

GAS AND WATER COMPANIES IN THE STOCK MARKET.

(For Stock and Share List, see p. 1051.)

THE Stock Markets again last week, as in the week before, shaped their course very irregularly; and the evenness of their movement was broken by the close holiday on Tuesday, which is an annual fixture. Hopes and fears as to the upshot of the Fashoda incident alternately buoyed them and depressed them; and the fluctuation went on through the week until Saturday when Lord Salisbury's announcement at the Mansion House the previous evening effectually turned the scale. Prices consequently recovered what they had lost; and in most cases showed a balance to the good. Buyers, however, are not in a great hurry to invest—confidence being a plant of slow growth; and so business still remains rather quiet. The Money Market was firm and steady. There was less demand for short loans; but discount rates keep level. Business in Gas securities is still at a very reduced level, although transactions last week were not quite so limited as they were the week before. Changes in quotation were few, and all the leading issues are quite unaffected; but two or three of those of lesser importance had a small decline. In Gaslights, there was a fairly numerous list of transactions in the "A;" and prices ruled very steady and even all through the week—never going outside 289-91. The secured issues were not uniformly quite so strong; but the only actual retrograde movement was in the 6 per cent. debenture. South Metropolitan was firm and unchanged on quiet business. Commercials were quite inert again. The Directors have resolved to issue at Christmas the £75,000 further capital—half in new stock and half in debenture—which was authorized at the October meeting. There was hardly anything done in the Suburban and Provincial group; but Alliance and British were each a little weaker. The Continental Companies were again almost absolutely stagnant. Transactions were rare; and they gave no sign. Among the rest, the only feature was a further advance in Buenos Ayres. There was perhaps a shade more animation in the Water Companies; the tendency being towards reduced prices, especially for the debenture issues, most of which had a set-back. This may be sufficiently accounted for by the policy adopted last week by the London County Council.

The daily operations were: Business in Gas opened very quiet on Monday; but prices were steady, and Buenos Ayres rose ¼. Tuesday was a holiday. Wednesday was a little more brisk; but British dropped ½. In Water, West Middlesex fell 5. Thursday produced some activity in Gaslight "A" at middle figures; but the 6 per cent. debenture stock receded 3. Business on Friday relapsed into extreme quietude. Alliance and Dublin old fell 1. In Water, the 4 per cent. debenture stocks of the Grand Junction, Lambeth, and New River Companies moved back 2; ditto of Southwark, 1; and Southwark ordinary, 1. Saturday was as active as any day of the week; but no further changes took place.

ELECTRIC LIGHTING MEMORANDA.

Mr. W. H. Preece as President of the Institution of Civil Engineers—Misplaced Optimism—A Sorry Argument.

MR. W. H. PREECE is this year's President of the Institution of Civil Engineers; and in this capacity he delivered his Inaugural Address at last Tuesday's meeting. Mr. Preece is a specialist, and he very rightly put this fact in the forefront of his address, which was largely devoted to the praise of the electrical branch of engineering. Thus was heard—not for the first time—how in supplying light, without defiling the air we breathe in our dwellings with "noxious vapour," electricity has proved to be a true benefactor of the human race. Mr. Preece cannot find anything

good to say of the operation of the Companies Acts, which he accuses of retarding the development of electric lighting in this country; but, happily, "the success, the comfort, the intrinsic value, the economy, and the sanitary properties of electric light have commended it to our municipal magnates, and its introduction has become the fashion." The British joint-stock company system may be as black as Mr. Preece paints it; but it is a little difficult to reconcile his denunciation of the system with his declared admiration of the progress of the electrical industries in the United States. This he describes as "phenomenal," using the word in the usual but improper sense of "remarkable." He gives £48,207,527 as the capital of United States electric lighting companies; while the same kind of companies in the United Kingdom have only £3,258,343 of capital. What is the distinction between English and American companies, that we should admire the enterprise of the latter and throw stones at the former? Logic, however, was never Mr. Preece's strong point. He goes on to assure his hearers that, in spite of all drawbacks, English electrical engineering is doing pretty well. "Lamps are being improved and cheapened, wiring is being reduced in cost, and the economic distribution of energy is being furthered." Is all this being accomplished by English joint-stock companies, or in spite of them?

We are bidden by the same high authority to mark that "the most promising field for economy is the combination of all classes of electrical industry in one centre, especially that of light and tramway works, where fuel is cheap, water abundant for condensing, and nuisances of no account." But it was made to appear at the recent meeting of the Associated Municipalities that this was precisely the kind of electrical enterprise that these authorities could not countenance by any means. Mr. Preece endeavours to sit upon two stools. He remarks that the cost of the production of electrical energy depends chiefly upon the continuity of its output. "If it can be generated continuously during the 24 hours of the day, its cost is only a fraction of a penny per unit. If it is used solely for light, a unit may cost 3d. Hence local authorities who are undertakers of electric energy, neglect their duty to those who have elected them as the custodians of their interests if they fail to secure the tramways in their district, either as their own property or as customers for their current. For the tramways, by taking energy during the day, reduce the cost of working during the night by removing the incubus of running continuously imposed on undertakers by Act of Parliament." What in the world does this mean? The speaker is not merely illogical here, he is slipshod to the verge of stumbling over the plainest facts. This is not the style of diction, nor is it the quality of proof, that one looks for in a presidential address of the Institution of Civil Engineers. Mr. Preece went on to dilate upon the success of electric lighting for ships; but he did not mention the case of the "Mohegan."

It is perhaps only another example of Mr. Preece's careless use of words, when he declares that electric lighting on board ship has been an "unqualified success." Even he, however, shrinks from saying as much of electrical lighthouses. No new electric lighthouse has been fitted up on the English shore line since 1888, which is a very remarkable fact. There are only four such lighthouses upon the English coast; and they are all in the Channel, except the one at Soutar Point. There are electric lights at the Lizard, St. Catherine's, and the South Foreland; and Mr. Preece admits that sailors do not like them. The lights do not assist navigators in judging distances; they are too dazzling during fine weather; while in fogs they are no better than common oil-lamps. Wrecks have occurred in the immediate vicinity of all these lights. It is questionable whether any addition to the electric lights in this service would be of any benefit; while every establishment of the kind is notoriously costly to fit up and maintain. Says Mr. Preece, "Any change of our well-considered and deeply-important coast lighting system is not to be hastily effected. We are very proud of our well-guarded shores. Every headland and landfall, every isolated rock, all dangerous shoals and banks and narrow channels in lines of trade, are so illuminated that navigation by night is as safe and easy as by day." And the "Mohegan" yet lies in her grave on the Manacles.

Mr. Preece is hardly more convincing in his observations upon electric traction. He remarks that the relative merits of overhead and underground conductors, and the use of storage batteries, are "practically the only important engineering questions under discussion"—the coming of electric traction being certain. It is wonderful how so severe a critic of English joint-stock trading methods can shut his eyes to the flagrant methods by which the trolley wire was forced upon the people of the United States. Mr. Preece has nothing to say against the general introduction of the same system of tramway working into England. "Its erection does not interfere with the traffic of the streets. The principal objection to it is its anti-aesthetic (*sic*) appearance. But it is wonderful how ideas of utility and the influence of custom make us submit to disfigurement. What is more inartistic than a lamp-post, or more hideous than the barn-like appearance of many a railway terminus?" After this, it is almost waste of time for Mr. Preece to declare that, while the electrolytic and induction effects of the introduction of powerful currents into the earth are serious considerations, "fortunately the remedies are simple, easily attainable, and very effective." It is regrettable; but Mr. Preece does not inspire confidence in the assertions he makes concerning the resources of electrical science. As to his implied suggestion that the British public should put up with the trolley wire because many railway stations are ugly and street lamp-posts not always "artistic," this is as strange a piece of Philistinism as ever resounded from the Great George Street Institution, which is a good deal to say. Engineers of sorts have doubtless committed many sins against the canons of good taste in buildings necessitated by the exigencies of the railway and other services of our towns; but it is not right to advance these errors as excusing the ruin of every historic and well-planned thoroughfare in the kingdom by the introduction of the trolley wire.

THE WATER ACTS OF 1898.

(*Continued from p.* 970.)

THE following Acts relating to water supply were obtained last session by Local Authorities.

The Northam Urban District Water Act authorizes the creation of an undertaking for the supply of water in a district of North Devon which is without any proper supply. The works are to include a storage reservoir, to be situated in the parish of Parkham, for impounding the waters of the stream rising on Melbury Moor known as the Melbury Stream. Compensation water is to be discharged at the rate of 67,500 gallons per day; the delivery to be "as nearly as possible continuous throughout each day." A road leading from Bideford to Bradworthy is to be diverted. The works are to be completed within seven years. The rate for domestic supplies is to be 10 per cent. on the rateable value. For the purpose of preventing and detecting waste, the District Council are empowered to place meters on mains and service-pipes, and to break up, and interfere temporarily with, public and private streets, and gas and water pipes. The price of water supplied by meter is not to exceed 2s. per 1000 gallons, with a minimum payment of 8s. per quarter. Premises left unoccupied for 48 hours may be entered for the purpose of cutting off the supply and removing the water-fittings. Public fountains may be set up; but not against private buildings without consent. The sum of £27,000 is to be borrowed for the purchase of lands and the construction of the authorized works, in addition to the cost of any land required to be bought for the protection of the sources of supply.

The Rochdale Corporation Water Act authorizes the acquisition by the Corporation of the undertaking of the Todmorden Water-Works Company, who were incorporated in 1882. The transfer is to be for a consideration set out in detail in the Act, which includes the payment of a sum of £1750 for compensating the officers of the Company and discharging the costs of winding up. The Company's Order of 1890 is repealed. The Corporation annuities issued to the shareholders are redeemable by agreement at the market price for the time being; and by the end of 1948, all outstanding annuities are to be redeemed for a cash payment of 35 years' purchase. In the event of the Todmorden Corporation procuring statutory water powers in the same session, the Corporation of Rochdale are to sell the Todmorden portion of the undertaking to them. New works are authorized, including a storage reservoir called the Ramsden reservoir, and another called the Hey Head reservoir. The water of numerous streams is to be taken, subject to detailed compensation arrangements. The works are to be completed within ten years. The provisions relating to the taking of lands, wholly or in part, are to be carried out under the direction of a tribunal. The sum of £235,000 is to be borrowed for carrying out the works extensions. Power is given for the issue of a new redeemable Corporation stock at a lower rate of interest than that sanctioned by the Act of 1884. The money required for buying out the Todmorden Company is repayable in fifty years; and the new reservoirs loan, in sixty years. Advantage may be taken of the Local Loans Act, 1875. The Corporation are not to create irredeemable stock, nor invest their sinking fund in their own securities. The Corporation may supply water in bulk to Local Authorities through whose districts the authorized works will pass. Wherever they want to go for this purpose, the Corporation are empowered to exercise the powers of the Water-Works Clauses Act, 1847, with respect to the breaking up of streets for main laying.

The Wath-upon-Dearne Urban District Council (Water) Act, provides for the sale and transfer of the whole undertaking of the West Melton Water-Works Company, Limited, to the District Council, in accordance with the terms of a scheduled agreement. The Company have an agreement with the Dearne Valley Water-Works Company for a supplemental supply in bulk, which is dealt with in a clause of the Act. The Council take over all the debts and liabilities due to or by the Company. The Dearne Valley Company are not to supply water within the district of the Council. Rates for domestic supplies are to range from 1s. 1½d. in the pound of rateable value. Water may be supplied by meter for other than domestic purposes at the price of 1s. 6d. per 1000 gallons. The right of entry is granted for the inspection of water-fittings. Outlying portions of the undertaking are to be sold to the Local Authorities on demand; and in ascertaining the value of such portions, any increased water-rates authorized by the Act, or prospective profits, are not to be considered.

The Bacup Corporation Water Act empowers the Corporation to acquire additional lands and wayleaves within five years, and construct within ten years two reservoirs for impounding the waters of the Cowpe Brook, at places situated within the boroughs of Bacup and Rawtenstall. Compensation water is to be provided under detailed conditions; and the water for the new reservoirs is only to be taken when the natural flow is above a stated minimum. Clauses are inserted for the protection of various interests. Water may be furnished by meter for all purposes. Rawtenstall residents who have been supplied with water by the Bury Corporation are not to be put to any expense when the service is taken over by the Bacup Corporation.

The Carlisle Corporation (Water) Act empowers the Corporation to obtain water from certain tributaries of the River Gelt, in Cumberland. For this purpose, works are authorized comprising intakes, weirs, and reservoirs. It will be necessary for the trunk main to cross the Settle and Carlisle section of the Midland Railway, for which purpose a cast-iron pipe, as approved by the Company's Engineer, is to be used, to be laid in and covered by cement concrete at a depth of not less than 4 feet below the rail level. The works are to be completed within ten years. The waters of the River Gelt are only to be taken when the overflow is more than 1½ million gallons per day. The Corporation are to supply the Brampton District Council with such daily quantities of filtered water as may be required, up to 220,000 gallons, free of charge. Clauses are inserted for the protection of the Naworth Castle and Croglin estates. Existing waterworks may be discontinued, and the sites sold. A new loan of £150,000 is authorized. Surplus water profits are to be applied in reduction of the rates for domestic supplies.

The Carmarthen Improvement Act authorizes the extension of the borough; and provides for the enlargement and improvement of the water supply by the procuring of an additional supply from the Nant Cwm Tawel stream in the parish of Newchurch. The works are to be completed within seven years. The charge for domestic supplies is to be 10 per cent. on the rateable value. Supplies for all purposes may be by meter, at the maximum price of 2s. per 1000 gallons. The sum of £25,000 is to be borrowed for water purposes.

The East Ham Improvement Act extends to the district of the Council the provisions of the Metropolis Water Acts of 1852 and 1871 relating to constant supply, so far as the East London Company's limits are concerned; the Council being substituted for the Metropolitan Authority mentioned in the Acts.

The Edinburgh and District Water-Works Act authorizes the construction by the Trustees of new and additional works, comprising the deepening of the Gladhouse reservoir, and the diversion of certain aqueducts already sanctioned. The whole surplus waters of the streams feeding this reservoir may be taken. Power is granted for the purchase of parts only of necessary property. The works are to be completed within seven years. The limits of compulsory supply are declared to be the city of Edinburgh and the town and port of Leith. The Trustees may enlarge or increase the number of their pipes; and also supply water in bulk in the parishes of Temple and Carrington, in Midlothian. The sum of £200,000 is to be borrowed for the purposes of the Act.

The Halifax Corporation Act contains a part relating to water supply. Three new reservoirs—called the Walshaw Dean Lower, Middle, and Upper reservoirs—are to be formed to impound the waters of a stream known as the Alcomden Water, or Walshaw Dean Water, with a supplementary intake from the Grey Fosse Clough. The works are to be completed within ten years. An agreement with the Todmorden Rural District Council is scheduled and confirmed. The Bradford Corporation are protected by clauses set out in detail; and there is a general protection afforded to the Keighley Corporation. The period for repayment of the existing corporation debt is equated, and one sinking fund is established. Water-works loans are repayable in sixty years.

The Hamilton Water Act sanctions the construction of an additional reservoir upon Kype Water, having a capacity of at least 142 million gallons, so that the Commissioners need not take for the purposes of the Act a greater quantity than 1½ million gallons of water per day. Clauses are inserted for the protection of the District Committee of the Middle Ward of the County of Lanark. A supply of water in bulk, not exceeding 100,000 gallons per day, may be demanded by the Committee. Detailed provisions are made with respect to the compensation water. If the Commissioners should find themselves unable to provide the covenanted amount of compensation water, they are to apply to Parliament for powers to construct an additional reservoir to be used for this purpose. The authorized works are to be completed within seven years. Houseowners are compellable to take a sufficient supply of water from the Commissioners. The sum of £45,000 is to be borrowed. The Corporation may contribute out of the burgh funds the sum of £10,000 to the water loan, at not exceeding 3 per cent. interest. Surplus water profits are to be applied to the enlargement and improvement of the works.

The Ilkeston Corporation Act contains a part relating to water supply, by which the Corporation are enabled to make a new well and pumping-station in the vicinity of their reservoir at Little Hallam, to be completed within five years. Supplies for all purposes may be measured. The sum of £30,000 is to be borrowed for water purposes.

The Keighley Corporation Act extends the period limited by the Act of 1891 for the completion of certain water-works to ten years from the passing of this Act. In lieu of a reservoir sanctioned by an Act of 1869, another similar work may be constructed in the parishes of Stanbury and Haworth, upon the Sladen Beck. New provisions are made for the supply of Oakworth, the population of which district are to have not exceeding 25 gallons per day, at the price of 6d. per 1000 gallons in bulk. The sum of £45,000 is to be borrowed for water-works purposes.

The St. Helens Corporation Act contains a part relating to water. It is enacted that a water reserve fund of £20,000 may be formed. Water-rates are recoverable as rates or as a civil debt, and are made parochial or local rates under section 1 of the Preferential Payments in Bankruptcy Act, 1888.

The Todmorden Corporation Water Act authorizes the acquisition within five years of lands and easements for water-works extensions. A reservoir, to be called the Gorpley reservoir, is to be formed by means of damning the stream known as Howroyd Clough or Gorpley Clough; and a similar reservoir, called the Howroyd reservoir, is to be made higher up on the same stream. Compensation water is to be provided. An arrangement is sanctioned for the temporary supply of the borough by the Rochdale Corporation, as from the transfer to them of the undertaking of the Todmorden Water Company (see *supra*). The Rochdale Canal Company are protected. The rates for domestic supplies range from 7½ to 6 per cent. Supplies may be by meter; and it is provided that where the Corporation refuse to supply any building used partly for trade purposes except by measure, they are to afford the occupier a sufficient supply for domestic purposes at not exceeding 1s. 6d. per 1000 gallons. But the Corporation are not compelled to afford to any premises a supply of water by measure for a less sum per quarter than the ordinary rate. The sum of £109,000 is to be borrowed for the purchase of lands and the construction of works, to be repaid in sixty years.

The Tynemouth Corporation (Water) Act enables the Corporation to acquire lands in the parish of Bedlington, within five years, without the owners' consent. An impounding reservoir is to be constructed upon the River Font, to be completed within ten years. A pipe-line across Morpeth Common is to be finished within six months. Sporting rights on the Font reservoir are reserved to the landowners, subject to the non-fouling of the water. During the construction of the new works, the Corporation are to be chargeable with the expenses of extraordinary traffic on the main roads. Dogs are not to be brought upon the works during construction. The waters of the River Font are only to be taken when the natural flow exceeds 167 cubic feet per minute, under a penalty of £50 per day. The water supply is to be efficiently treated for the prevention of plumbism. The right of storage of water in certain existing reservoirs is formally enacted, with reference to the provisions of an Act of 1786 obtained by the North Shields Water-Works Company. The sum of £430,000 is to be borrowed for water purposes, or the money may be raised by the issue of redeemable stock.

The Wigan Corporation Act is to enable the Corporation to construct settling-tanks in connection with their water-works, upon their own and certain adjacent lands to be compulsorily acquired for the purpose. The sum of £3000 is to be borrowed for the same purposes.

The Wishaw Water (Additional Supply) Act empowers the Commissioners to make a weir on the stream called the Potrenick Burn, in the parish of Crawford, Lanarkshire; another on the Potrail Water; and a third on the Peden Burn. Further parliamentary powers are to be obtained for the construction of a compensation water reservoir. The authorized works are to be completed within five years. The powers of water supply in a stated district of the Lanark County Council are abrogated, and the lump sum of £750 is payable in compensation therefor. Local authorities on the line of the works may be supplied by the Commissioners. Clauses are inserted for the protection of the Burgh of Lanark. The sum of £95,000 is required for water-works purposes. The manner of rating property for the purposes of the Commissioners is set out in detail.

The Yeovil Corporation Act authorizes the construction of additional collecting ponds, to be completed within eight years, subject to clauses protecting the owners of the Melbury Estate. The sum of £50,000 is to be borrowed for water purposes.

A Possible Danger of Steam-Jets as Fire Extinguishers.—The current number of "Cassier's Magazine" contains the following instance of the danger of using steam-jets for extinguishing fire: On a cargo steamer carrying several hundred tons of coal and as many more of miscellaneous chemicals and old rope, fire broke out in one of the holds, which were furnished with steam-jet fittings; and the jets were at once turned on. On the day following it was proposed to try a hose, in addition to the jets; and one of the upper deck hatches was taken off. The almost immediate result was a violent explosion, killing one of the officers and seriously injuring another. All the other hatches were blown off at the same time, and the ship began to leak, so that she soon had to be abandoned. One explanation advanced was that the steam from the jets, passing over the incandescent cargo, formed water gas, which, with a suitable admixture of air, became explosive, with the result noted.

THE LATE MR. ROBERT HUNTER.

The friends of the late Mr. Robert Hunter, of Chester, will learn with regret that Mrs. Hunter and her eight children (only one of whom is old enough to earn anything) are left with sadly insufficient resources to meet pressing needs. The Manchester District Institution of Gas Engineers are moving privately in this matter; and the Masonic brethren of the deceased are asked to reserve their votes for one of the orphans, a girl, who is to be nominated for election to the schools. Three of the children are too old, and four too young, for the next election. It has been suggested in several quarters that friends of Mr. Hunter, outside the Manchester Institution, would like to help his family in their necessity; and we, therefore, notify that donations to a fund for the purpose will gladly be received by Mr. Walter King, at the offices of the "Journal," and duly acknowledged in our columns.

OBITUARY.

The death occurred on Monday last week of Mr. Latimer Clark, the eminent civil and electrical engineer, in his seventy-seventh year. Deceased, in conjunction with Sir Charles Bright, proposed, in a paper read before the British Association, the names of ohm, farad, and volt for electrical units. Mr. Clark had taken out about 150 patents in different countries to secure the value of his various inventions, relating not only to electric telegraphy, but also to engineering work in general.

PERSONAL.

Mr. G. F. Deacon has been appointed Engineer for the new water-works to be constructed at Gorpley for the Todmorden Corporation.

Mr. J. Woodhead, J.P., who has rendered eminent service to Huddersfield—having been twice Mayor, and filled the position of Chairman of the Gas and Finance Committees of the Corporation—has been presented with the honorary freedom of the borough.

On Saturday, the 29th ult., Mr. Clifford G. Horton, son of Mr. G. A. Horton, Engineer of the King's Cross station of The Gaslight and Coke Company, was presented by the employees with a handsome gold watch and chain on attaining his majority.

Mr. Alexander Allan, who is at present filling the position of Superintendent of the Neepsend station of the Sheffield Gas Company, has been appointed Engineer to the Chester Gas Company, in succession to the late Mr. Robert Hunter. Mr. Allan has been ten years at Sheffield, during the first two of which he was Superintendent of the Company's Effingham Street station.

On Saturday, the 29th ult., the Queen Victoria Street and Stratford staffs of Messrs. Richmond and Co., Limited, met at the residence of Mr. and Mrs. E. W. T. Richmond, Summer-court, Romford, for a social evening. Opportunity was taken during the proceedings of presenting to Mr. H. Makin (Mr. Richmond's confidential clerk) a handsome case of cutlery, on the occasion of his recent marriage. The Warrington officials also presented a marble clock.

Water-Meters as Waste Preventers.—In a paper read before the Engineers' Club, Philadelphia, Mr. J. C. Trautwine advocated the general adoption of meters as the only means of preventing the excessive waste of water for which the population of that city have established an unenviable reputation. In two streets, having 539 inhabitants and 782 appliances, the daily supply was no less than 179 gallons per head, of which only 24 gallons were used—the remainder passing direct to the sewers.

Utilization of Carbonic Acid Gas for Motive Power.—Borings which have been made in several parts of Germany—notably in Gotha—have revealed the presence beneath the earth's surface of enormous quantities of carbonic acid gas, which is being utilized at Sondra and elsewhere for the production of motive power. At this particular boring, some 25,000 cubic metres, or close upon 1 million cubic feet, of gas are emitted daily; and it is conveyed away under its own pressure (17 to 20 atmospheres) through a 2-inch pipe to a manufactory nearly three miles distant. There half of it is reduced to a pressure of 10 atmospheres; and the energy thus liberated is used to work specially-designed engines by which the other half is further compressed till it assumes a liquid form at zero temperature. This requires a pressure of about 38 atmospheres. It is then stored in steel cylinders capable of resisting a pressure of 250 atmospheres; and in this shape it becomes an article of commerce. The price of the gas is about 6d. per litre (1·76 pints); and those who are interested in the industry contend that it has already entered into competition with the older mechanical agents, steam and coal gas.

NOTES.

Acetylene and Coal Gas Lighting.

Discussing the prospects of acetylene lighting, the "Ironmonger" takes a very sensible view of the situation. It is pertinently remarked that when anybody has a novelty of this sort to recommend as superior to an old and well-tried friend, it is the chief duty of the advocate to see that none of his assertions overstep the limits of bare truth. For if once an exaggeration or misrepresentation is detected, the whole case breaks down. So in the matter of acetylene lighting—which competes with coal gas if with anything—it is most important that nothing should be advanced in favour of the former which anyone with experience and knowledge of the latter knows to be false. Unfortunately, many statements about the advantages of acetylene lighting that have been put in circulation by interested parties cannot be substantiated. Our contemporary distinguishes several of these—as that acetylene made by A's apparatus is safer than B's gas of the same name; and that ceilings are not blackened by acetylene flames. It is remarked upon the latter head: "Surely everybody knows that the discoloration of the ceiling in an ordinary room is caused, not by free carbon derived from flame of candle, lamp, or gas-burner, but by the rapid current of hot air produced by these illuminants or any other hot body, which current, carrying with it in its upward path all the dust and dirt already in the atmosphere, deposits them on the cold and rough surface of the ceiling." As for the comparative cost of acetylene and coal gas lighting, it is conceded that the former is out of the running, in this regard. Yet the true field for acetylene is granted to be a wide one; and there is plenty of room in it for all deserving forms of apparatus.

Chemists on the Rare Earths.

Chemists are still diffident of expressing themselves in definite terms with respect to the nature of the strange minerals generically called the "rare earths," which have of late years sprung into commercial prominence in connection with incandescent gas lighting. It is becoming understood that, though the epithet "rare" may be disestablished as regards these substances, in the sense of "scarce," by the discovery of unsuspected and inexhaustible deposits of the minerals, it must remain apposite as regards the extraordinary physical qualities of some of the metals and their salts. An enormous amount of labour is actually being spent upon the chemistry of the rare earths; and though the actual results attained do not appear to justify so much attention being paid to an obscure corner of chemical science, it must be remembered that it is precisely such work that goes to the heart of chemistry. Nobody can foresee the industrial applications of the future. Professor Tilden inclines to the view that as regards the origin of these strange elements, the choice lies between the notion that they represent the ruins of a former state of things upon the earth, or they might stand for those "old worn particles" referred to by Descartes. On the other hand, the idea is suggested that they are the results of the condensation of the original "protyl," though in some way the process differed from that which gave rise to the rest of the elements. All this is mere speculation, of course; but the character of the earths is such as to excite the chemical imagination to the highest degree, when, of course, it suggests many things not deducible from ordinary observation. Such remarks as those of Professor Tilden upon the rare earths go to show that there is even in the domain of chemistry—one of the most exact of the physical sciences—a borderland between the known and the unknown where the fancy can run riot and find "fairy tales" the nearest approximation to verifiable facts.

Mr. Blashill and Coke Breeze Concrete.

Mr. Thos. Blashill, lately retired from the position of Architect to the London County Council, will be memorable as the first official of the kind to largely use and encourage the employment in town buildings of coke-breeze concrete, as a fire-proof building material. During his tenure of office, Mr. Blashill frequently expressed himself very strongly respecting the fire risk of ordinary building construction; and at the Manchester meeting of the Surveyors' Institution he questioned "whether danger from fire is not increasing in spite of Building Acts." The fact is that town buildings are getting more lofty, more closely packed together, and more thickly inhabited. In commercial buildings the rooms are larger and more encumbered with goods, among and over which manufacturing processes are being carried on. There is more machinery actuated by heat. The timber used is more easily combustible, fittings are lighter, and everything is kept warmer and drier. "All our arrangements for obtaining light, from the lucifer match to gas and mineral oil and electricity, are novel and productive of new dangers." In the last Cripplegate fire, the progress was as rapid as, and the destruction over its limited area no less complete than, in the Great Fire of 1666; the only difference was in the appliances and arrangements for fire extinction. Speaking of fire-resisting construction, Mr. Blashill stated that in the great rehousing schemes of the London County Council he has made every floor comparatively safe by the use of steel joists wide-spaced, and filled in solid with coke-breeze concrete, upon which the floor-boards are nailed; the plastered ceiling being done under

the concrete direct. The cost is no more than a good wooden floor, while the thickness is only 7 inches, which saves 2 inches or 3 inches in the height of each storey. If noise were complained of, a cork covering to the boards under the carpet would be a sufficient remedy. If wooden joists must be used, they can be double the usual thickness, 2 feet apart, and the space between "pugged" flush with coke concrete, 4 to 1, which stands fire and water better than anything else. Roofs should be of concrete. As for partitions, Mr. Blashill commonly used coke breeze concrete about 2 inches thick. Where old lath and plaster partitions exist, they can be improved by removing the plaster from one side only and fitting in with coke-breeze concrete. Mr. Blashill's chief idea was to get rid of all hollow spaces which can harbour fire. The work of the carpenter is to be excluded as far as possible.

Professor Lewes on Acetylene.—The first course of Cantor lectures at the Society of Arts in the coming session will be by Professor Vivian B. Lewes, F.I.C., F.C.S. They will commence on Monday, the 21st inst. In the opening lecture, Professor Lewes will sketch the history of acetylene, and deal with the various methods of forming it, its chemistry, and the part it plays in luminous flames. The second and third lectures will be devoted to the commercial production and generation of acetylene, and its purification for domestic consumption. In the final lecture, the combustion of acetylene, acetylene burners, the smoking and carbonizing of burners, the use of acetylene for heating and motive power, and its application in a diluted form, will be considered. The lectures will commence each evening at eight.

Photometrical Tables.—Our readers are aware that, according to the revised Notification of the Metropolitan Gas Referees issued last May, the correction of the illuminating value of the gas, to compensate for abnormal conditions of temperature and barometric pressure, might be made either by multiplying by the aerorthometer reading, or by dividing by the tabular number, the value found by the formula. With the view of saving the observer the labour of making the calculations, Mr. A. Vernon Harcourt has prepared a series of tables, with explanations as to their use, in the hope that they may promote the adoption of the system of photometry now prescribed for the Metropolis. The tables are not officially issued by the Referees, but they are to be had of Mr. W. J. A. Butterfield, No. 66, Victoria Street, S.W.

The Kinetic Theory of Gases.—In the current number of the "Contemporary Review," Professor Ramsay deals with the above subject in connection with recent discoveries of gaseous constituents of the atmosphere. He summarizes the facts as follows: "The discovery by Lord Rayleigh of a discrepancy in the density of atmospheric nitrogen has resulted in the discovery of a new consistent of air, argon; and its discovery has led to that of a constituent of the solar atmosphere, helium. Speculations on the ultimate nature and motion of the particles of which it is believed that gases consist has provoked the consideration of the conditions necessary in order that planets and satellites may retain an atmosphere, and of the nature of that atmosphere. The necessary existence of an undiscovered element was foreseen, owing to the usual regularity in the distribution of the atomic weights of elements not being attained in the case of helium and argon; and the source of neon was therefore indicated. This source—atmospheric air—was investigated, and the missing element was discovered." This is a highly interesting summary.

The Nitrogen Question.—In a paper by Messrs. W. Carrick Anderson and J. Roberts, on "Some Chemical Properties of Scottish Coal," which came before the Scottish Section of the Society of Chemical Industry last Tuesday, reference was made to the Inaugural Address of Sir W. Crookes at the recent meeting of the British Association, in which he advocated the use of nitrogenous manures to increase the fertility of the soil in order to stave off a possible failure of the wheat supply in the future. The authors thought that, in arriving at the conclusion that the imminent danger to which he pointed was only to be averted by the wholesale fixation within the next generation of atmospheric nitrogen to the equivalent of 13 million tons of nitrate of soda per annum, Sir William ignored the possibility of a more scientific utilization of the world's vast supplies of mineral fuel placed at the disposal of the farmer, and the much larger proportion of the enormous stores of combined nitrogen existing therein in every one of the continents. The annual output of 200 million tons of coal contained, it was stated, on an average 1 per cent. of nitrogen, representing 2 million tons of combined nitrogen, equivalent to nearly 9½ million tons of sulphate of ammonia from the United Kingdom alone, if it were possible to recover it completely in this form. But even the present imperfect methods of recovery would be capable of producing 1¼ million tons annually in this country, if the whole of the output were carbonized, and the ammonia recovered, as was done in gas-works and blast-furnaces at the present moment. The production of Continental Europe would probably be as much; while America, India, China, and many other countries, would furnish, for a much longer period than thirty years, contributions of no inconsiderable amount.

COMMUNICATED ARTICLE.

THE PURCHASE OF GAS UNDERTAKINGS.

By Frank Balfour Browne,
Of the Middle Temple, Barrister-at-Law.

There seems to be a growing tendency to municipalize various public undertakings. Indeed, it seems to be the ordinary history of such undertakings that they are taken up at first by private enterprise, that they are pushed to success by private enterprise, and that they then excite the cupidity of corporations, and are, either by agreement or by compulsion, passed over into municipal hands. Anyone who is familiar with the Private Bill Legislation of the last half century will admit that, for many years, communities had to depend for their water supplies on the enterprise of companies, and now there are few great towns, excepting London, Newcastle, Bristol, and Portsmouth, where the water undertaking is not in the hands of the corporation. The same thing is to a large extent true with regard to means of illumination. Here, again, companies stepped in where corporations had not the courage to risk public money in the supply of gas or electricity. When, however, the pioneer companies had shown the way and had made large profits, the corporations of most of our large towns desired to have the gas-works in their own hands, and to apply gas profits in relief of rates; and to-day most of our large towns are supplied with gas by corporations as the successors of companies. A like tendency is seen in relation to tramways. These were exploited by private capital; and at one time the Legislature, having set its face against municipal trading, prevented corporations working their own tramways if they could succeed in leasing them to a company. But the Standing Order which made this law has gone; and now most of our large towns are either conveying tramway passengers or are preparing to do so when the concessions to the existing tramway companies come to an end. It would be easy to trace this tendency in other directions; but sufficient has been said for the present purpose.

It has been noted, then, that there is a tendency to pass gas undertakings over into the hands of municipal bodies. This has taken place under the powers of Compulsory Purchase Bills in a considerable number of instances. The earliest case on record, so far as we know, is the Bill for the compulsory purchase of the Rotherham Gas Company, which was promoted in 1874. There seems to have been serious default upon the part of the Company; and this probably justified the action of Parliament in compelling them to sell their works. Some more recent cases are, however, more to the point. The Ilkley Local Board promoted a Bill for the purchase of the gas undertaking. There, the Counsel for the Local Authority accused the Company of "juggling with the accounts." The quality of the gas supplied was complained of; but the Bill passed one House, and the Company came to an agreement to sell while the matter was before a Committee of the second House. But a case where the question of compulsion was fought out to the bitter end came before Parliament only three years ago. The enterprising Local Authority of Matlock Bath and Scarthin Nick promoted a Bill for the purchase of the gas undertaking; and though the Company opposed in both Houses of Parliament, the Bill passed, and the works were shortly afterwards transferred—the value having been ascertained by Sir William Coddington.

These instances would be sufficient to indicate the tendency; but I will mention one more, and that is the Bill promoted in the last session of Parliament for the purchase of the Morley Gas Company by the Morley Corporation. This Bill came before a Committee of the House of Lords and passed; and the Company wisely refrained from carrying their opposition further. Clauses were settled, and the Bill passed through the Commons as an unopposed measure. Quite recently the question of the value of the undertaking, and the price that the Corporation of Morley were to pay, came before an exceedingly skilled tribunal consisting of Mr. James Mansergh, Umpire, Mr. Corbet Woodall, Arbitrator for the Corporation, and Mr. Thomas Newbigging, Arbitrator for the Company; and the proceedings on this arbitration have suggested that the principles of valuation of such undertakings are worth considering. This, like a case recently arbitrated upon by Mr. Shiress Will, Q.C. (the Cowes, Isle of Wight, Urban District Council and the Cowes Gas Company), may be taken as a leading case on the subject of the purchase of gas companies' undertakings.

One thing seems certain—that a going concern must be purchased for a sum not fixed by the amount of capital that has been expended, but by the income that is being earned. When an Act of Parliament contained a clause that a local authority might, upon notice, purchase from another "the mains, pipes, fittings, and apparatus in its district," and that after the purchase the rights of the latter to supply water in the district of the purchasing authority should cease, it was held by the Courts that the proper basis of valuation was, not the income earned, but the mains, pipes, &c., *in situ* capable of conveying and supplying water.* But in an ordinary case—such as that

* *Kirkleatham Local Board v. Stockton and Middlesbrough Water Board* [1893], 1 Q.B., 375.

of the Morley Gas Company—the clause is worded differently, and what has to be purchased is not merely "mains," and the like, but "the undertaking," which includes goodwill; and in all such instances the purchase price is founded upon the "maintainable income" derived from the undertaking in question.

It would seem easy at first sight to arrive at the income of a company, and also far from difficult to ascertain whether the income which has been earned in the past can be maintained in the future. But this is just one of the questions which occupies the attention of arbitration tribunals for a considerable time. The fact that the Company has earned (say) x pounds in 1897, is not conclusive proof of the fact that this amount was their fair income. For instance, the company may have obtained this income by charging a higher price for gas than they could continue to charge without diminishing the consumption. Or, again, they may have fairly earned a certain gross income, but the net income may have been made to appear too large by reason of the fact that the company had not spent the average annual amount on working expenses. One of the most fruitful sources of discussion in these cases arises in this connection. The accountants, we will suppose, have agreed upon the gross income earned. Then come the engineers, who say the net income is too large, because in the particular year chosen the company spent far too little on the repair and maintenance of the works or mains, or both.

In the Morley case, it seemed to be admitted by both sides that this was the position; but as to what was the proper amount to be spent in "maintaining the hereditament in a condition to command the rent," there was a considerable diversity of opinion. And such diversity must always exist. The question there was whether it should be 4d. or 5d. per 1000 cubic feet of gas sold; and a good deal of cross-examination was directed to show that this engineer had said that 6d. was the right amount in the Chesterfield case, or that that engineer had expressed a different opinion in the Stourbridge case, or that a third had said something quite incompatible with his present evidence in the Ashford, the Bakewell, or the Matlock Bath case. The fact is that, within certain limits, every case must, in this regard, be tried on its own merits. It can be quite well understood that in a small gas undertaking, and under exceptional circumstances such as those that may exist in a mining district, 7d. per 1000 cubic feet for repairs and maintenance might not be an extravagant sum to charge per annum for working expenses, and that in other instances the charge might even fall below 5d. per 1000 cubic feet.

But suppose all proper adjustments have been made in the working expenses, and that these have been deducted from the gross receipts, we have then arrived at the net receipts. Now comes *the* question in all these cases: How is the net income to be capitalized? On the one hand, you may find the company saying, as they did in the Morley case, 30·77 years' purchase is the proper multiplier, and the Corporation contending, again as in the Morley case, that the Company would receive the full value of their undertaking if the net income were multiplied by 25 years' purchase. Here also there was ample cross-examination by the method of reminiscence: "Is it a fact that in Ystrad you claimed to have allowed 28·57 years' purchase?" "Did you not in the Ashford case agree to 24 years' purchase of a non-statutory Company's undertaking?" and so on. This cross-examination is always effective in showing the tight places in which expert witnesses are placed. But here again it is well to avoid instances which may or may not bear upon the matter of inquiry, and to ascertain principles which are sure to have some bearing. What, then, are the considerations which determine the multiplier for the purpose of capitalization? The underlying principle seems to be that when the net income has once been ascertained, you must proceed to see how the income is secured. If it were as well secured as the interest on Consols, then it might have to be put in the 2¾ per cent. table. If, however, it is not so well secured, it must be put in another table, and therefore will have, as a multiplier, a smaller number of years' purchase.

The security for the income of any gas undertaking must depend upon a variety of local circumstances. In the Morley case, it was asserted that the town depended for its prosperity upon the trade in cloth, in coal, and in stone. As to the cloth trade, it was said that several mills had been closed, and that the trade, owing to the M'Kinley tariff, was far from prosperous. It was asserted, too, that the mills of the district had to an extent given up the use of gas as an illuminant, and installed electricity. As to the coal trade, it was stated that the mines had been to a large extent exhausted, and that such collieries as were still open were only being worked certain days in the week, and fewer hands were being employed. Again, it was said that there had been railway works going on in the borough which had employed some 200 men, and that these works were completed; also that the Corporation themselves had been constructing a reservoir, and that the men who had been working on it would cease to be employed. There was one other argument used to show that the Company's income was not well secured, and that was that the Corporation had recently (in March last) begun to supply electricity from their own works, and that a number of shops and public institutions had already taken or applied for a supply from the Corporation. All these considerations, no doubt, bore on the question, How is the income which we have arrived at secured? And the consequent question, Must it be multiplied by 25 years' purchase, as the witnesses for the Corporation said, or by 30·77 years' purchase, as the witnesses for the Company, with at any rate equal confidence, asserted?

I have mentioned these contentions as showing the scope of the inquiry which must be embarked upon in these cases. If the income is $£x$ to-day, but would be reduced to (say) $£\frac{x}{2}$ to-morrow, how is the $£x$ secured? Of course, the answer is that only half of it is secured. In every different case the circumstances which give security for the continuance of income must vary; and it is because of this fact that it is necessary in most cases to have recourse to an arbitration tribunal in order to determine the nice questions which are involved in such an arbitration.

While, however, on the question of the security for the income, we must not overlook an argument that is very often put forward upon such occasions, and that is that the Company has surplus plant, and that this of itself is a security. It is very frequently urged on the other side that the existing plant is in a defective condition, and that to enable it certainly and securely to earn the dividend a considerable sum must be spent upon purifiers, exhausters, gasholders, or distributing apparatus. Now this question can only be determined in each instance by evidence applicable to the particular case. If the plant is excessive and the consumption is increasing, then no doubt the extra plant is a good security for the present income. If, on the other hand, as was said in the Morley case, several of the appliances are defective, then, from the capital sum arrived at by the multiplication of the net income by a certain number of years' purchase, a capital sum to put the works in good order must be deducted. This, of course, is a question of fact which can be proved in each case, and which an expert tribunal such as sat in the Morley arbitration is eminently fitted to determine.

In the case which I have made the text for these remarks, there was another question raised, and that was the important one as to the allowance for compulsory sale. The arbitration was by the Act to be under the Lands Clauses Acts; but the special clause directed that the consideration to be paid to the Company should include a sum for the costs incurred by, or in connection with, re-investment. This provision, it was argued, was in lieu of the ordinary allowance of 10 per cent. for compulsory sale; and one of the witnesses for the Company admitted that the usual allowance would in an ordinary case cover the cost of re-investment of the money paid for the purchase. The provision for the payment of a sum for re-investment was an unusual one; and it would be interesting if the matter raised in argument could be submitted for the decision of a Superior Court. The arbitration tribunal will, of course, only find a lump sum; and it will be impossible to ascertain from the award what weight the various arguments or facts may have had upon the award.

I have purposely confined my attention in these notes to the questions which were raised in the Morley case. Many similar points were argued in the Stourbridge case (1893), in the Chesterfield case (1895), in the Matlock Bath case (1896), and in the Ashford and Cowes cases (1897); but the most recent case* illustrates the principles which underlie all such valuations of gas companies' undertakings as going concerns, and shows, too, when these principles are applicable only in relation to the facts of the particular case.

Southern District Association of Gas Engineers and Managers.—The next general meeting of the Association will be held on Thursday, at the Holborn Restaurant, under the presidency of Mr. R. Beynon, of Torquay. We learn from the circular issued by the Hon. Secretary (Mr. J. W. Helps) that the business will consist of the election of the President, Vice-President, and office-bearers for the ensuing year, as well as of new members proposed; and the reading of two papers—one by Mr. C. E. Botley, of Hastings, furnishing information as to his extended experience with the carburation process in use there for the prevention of naphthalene deposits, and the other by Mr. W. B. Randall, of Waltham Abbey, dealing with the interesting question of localizing leakage.

Institution of Mechanical Engineers.—The ordinary general meeting of the Institution was held on the 26th and 27th ult., under the presidency of Mr. S. W. Johnson. The President announced that Sir W. H. White, Chief Constructor of the Royal Navy, had been nominated as his successor; Mr. T. Hurry Riches as Vice-President; and Sir William Arrol, M.P., Sir B. Baker, Mr. H. Chapman, Mr. W. J. Pirrie, and Sir T. Richardson, M.P., as members of the Council. In a paper on "Electric Installations for Lighting and Power on the Midland Railway, with Notes on the Power Absorbed by Shafting and Belting," Mr. W. E. Langdon, Superintendent of the Electrical Department, showed that a considerable loss of power takes place in shafting and belting, but that this may be reduced by arranging to drive each tool or machine direct from an electric motor.

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* Since this article was written, the value of the Malvern Link Gas Company's undertaking, which is being purchased by the Malvern Urban District Council, has been submitted to the arbitration of Mr. Shiress-Will, Q.C., Umpire, and Mr. Corbet Woodall and Mr. Charles Hunt, Arbitrators for the Company and Council respectively.

TECHNICAL RECORD.

INSTITUTION OF CIVIL ENGINEERS.

Mr. W. H. Preece on the Position and Prospects of Electricity.

At the first Meeting of the Institution for the present session, held last Tuesday, the PRESIDENT (Mr. W. H. Preece, C.B.) delivered his Inaugural Address.

The President opened his discourse by expressing his gratitude for the honour conferred upon him by his selection as the recipient of the highest possible reward the Institution could give to those who had endeavoured to serve it well and truly. Dealing with the progress of the Institution since he entered it as an associate in 1859, he showed that the total membership had risen from 894 to 7088. Of the latter number, 71 per cent. are home, 21 per cent. colonial, and 8 per cent. foreign members. But the President pointed out that it was not alone in numbers that growth was shown; it was more apparent in the business of the engineer. The field of the profession had extended in all directions by the advance of practical science, and by a process of evolution and agglutination; with the result that it had been broken up into special branches and individual groups, with their separate organizations and independent homes. The various classes of engineers were, however, but species of one genus—the civil engineer, whose Institution, like a good mother, tried to keep them all under the protection of her wings, and who was prepared to make any sacrifice to advance the knowledge of engineering, and maintain the solidarity and reputation of the profession. The Engineering Conference held last year was undertaken in furtherance of this aim; and it was so successful as to call for its repetition in the spring of 1899.

Turning next to the subject of the examinations introduced by the Institution, the President pointed to the highly satisfactory results of the first one. Out of 24 candidates examined for studentship, only three failed to pass; while out of 40 examined for associate membership, but seven failed. Of 48 theses submitted in lieu of examination, only five papers did not secure a satisfactory report. The popularity of the measure was shown by the fact that 71 candidates entered for the last October examination. The papers sent had been by no means of an insignificant character; yet 86 per cent. of marks had been acquired on the whole examination. Consideration of this subject naturally led Mr. Preece to pass on to that of technical education. It was well, he remarked, that England was putting her schools in order. But was she doing so on a true issue, and was the money being distributed through the right channels? He thought our educational methods had begun at the wrong end—that we ought to teach the masters first and then the men. Moreover, we had to teach the teachers and those who had control of the purse-strings. We were suffering, he said, from a lack of competent teachers. The ideal professor of pure abstract science was generally behind his age. These were not the men for technical institutes. Such teachers should possess the diploma of the Institution.

Coming to the technical portion of the address, the President first dealt with energy, the principle of the conservation of which was, he said, the great generalization of modern days. He pointed out how every branch of engineering is dominated by the application of the great principle of work, which means the expenditure of energy. He emphasized the necessity for the engineer being an educated man, not necessarily so much in the languages, arts, and history of the past, as in the changes and properties of ever-present matter, and the forms and behaviour of never-failing energy—changes and transformations directed by his will, controlled by his knowledge, and applied by his hands. He thought Tredgold's well-known definition should be modified, and read: "The profession of an engineer is to apply the great principle of work to the use and convenience of man;" and his title be rather that of "energeer" than "engineer." Dealing with "energy in its most romantic form," the President next referred to electricity, the first practical application of which was by Franklin, in 1752, for the protection of life and property. Franklin's work had been beneficial. He demonstrated successfully how to bring the lightning down from heaven, and how to dissipate its causes harmlessly away in the earth. In 1837, Cooke and Wheatstone showed how electricity could be practically used to facilitate intercommunication of ideas between town and town, country and country. The President thought it was impossible to predict what would be the future of the telegraph; while with regard to the telephone, he informed his hearers that speech is now practically possible between any two post offices in the United Kingdom, and that theoretically it is possible to talk with every capital in Europe. "Telephony," said Mr. Preece, "is an Imperial business, like the post and the telegraph; and it ought to be in the hands of the State."

The next section of the address was devoted to railways; and then the President came to the subject of the utilization of electricity for domestic purposes and lighting. He acknowledged the useful work done by it in the former sphere, and then said: But it is in supplying us with light, without defiling the air we breathe in our dwellings with noxious vapour, that electricity has proved to be a true benefactor to the human race. The Legislature has facilitated the acquisition by municipalities of those local industries that affect the welfare of the whole community, such as road making, sewerage, the supply of water, tramways, and, above all, electric light. No one doubts that new industries of a speculative character are best pioneered by private enterprise. The company promoter has, however, so abused the power placed in his hands by the Limited Liability Act, that, not only has the development of electric lighting been retarded in this country, but the prospects of private enterprise in furthering other industries has been checked. Fortunately the success, the comfort, the intrinsic value, the economy, and the sanitary properties of electric light have commended it to our municipal magnates, and its introduction has become the fashion. The following table shows the position of the industry in this country and in the United States at the present time:—

	United Kingdom.		United States.	
	Municipalities.	Companies.	Municipalities.	Companies.
No. of central stations	72	63	338	2,251
Capital stock . . .	£4,599,154	£3,258,343	£3,419,019	£48,207,527
No. of arc lamps . .	5,753	1,259	26,087	265,064
No. of glow lamps . .	1,393,514	1,936,893	693,984	14,278,358
Kilowatt capacity . .	44,219	24,344	41,193	578,051

In spite of our financial troubles, of the inertia of municipal bodies, and of the active competition of vested interests, our progress compares not unfavourably with other European countries, but the progress of the industry in the United States has been phenomenal. The return for the United Kingdom is, however, by no means complete. It omits all private installations. We in the Post Office alone have 50,000 lamps which are not enumerated; and if we consider all our great railway companies, banks, warehouses, manufactories, and shops which have their own installations, the statistics will be very considerably extended. Lamps are being improved and cheapened, wiring is being reduced in cost, and the economic distribution of energy is being furthered. But the most promising field for economy is the combination of all classes of electrical industry in one centre, especially that of light and tramway working, where fuel is cheap, water abundant for condensing, and nuisances of no account. The cost of the production of electrical energy depends principally upon the continuity of its output. If it can be generated continuously during the 24 hours of the day, its cost is only a fraction of 1d. per unit. If it is used solely for light, a unit may cost 3d. Hence local authorities who are undertakers of electric energy neglect their duty to those who have elected them as the custodians of their interests if they fail to secure the tramways in their district, either as their own property or as customers for their current; for the tramways, by taking energy during the day, reduce the cost of working during the night by removing the incubus of running continuously imposed on undertakers by Act of Parliament. This may enable the ratepayers to be supplied at a price for electric light certainly 1d. per unit less than if there were no tramways. The cheaper the supply of energy per unit, the more certain and speedy the advent of the electric light as the poor man's lamp, and the more beneficial its introduction into the confined, ill-ventilated, and overcrowded homes of the working classes. By improving the locomotion to the suburbs, and enabling them to live in pure air, and by clearing the air they breathe of the impurities due to the combustion of tallow, oil, and gas, the more readily should the public fall down and worship the golden image which Parliament and Science have set up.

But it was on board ship, continued the President, that electric light had been pre-eminently successful, and where it supplied such a crying want that its introduction had not met with any check. It was almost immediately and universally adopted. Its introduction into lighthouses, however, had not been so successful. No new electric light had been installed on the coast of Great Britain since that at St. Catherine's Point (Isle of Wight) was fitted up in 1888. Other electric lamps were to be found at the South Foreland, at the Lizard, and at Soutar Point—only four lighthouses in all upon our coasts. This, he said, was due chiefly to the great prime cost of its installation and to the annual expense of its maintenance. But the sailor himself was not enamoured of it. It did not assist him in judging distances; it was too brilliant in clear weather, while in bad weather it penetrates a fog no farther than an ordinary oil-lamp. Moreover, great modern improvements had followed each other in apparatus, lenses, and lamps. A third-order light of to-day could be made superior to a first-order light of ten years ago. Oils had improved, and gas had been introduced.

Electric traction was the next subject taken up. The President emphasized his previous remarks as to the economy of combining electric lighting and tramway working. He said the relative merits of overhead and underground conductors, and the use of storage batteries, were practically the only important engineering questions under discussion. The underground conduit system had been materially helped by the practical object-lesson to be seen in New York, where the tramways were being very successfully worked on this plan. The trolley system was much more economical; and its erection did not interfere with the traffic of the streets. The principal objection to it was its anti-æsthetic appearance; but it was wonderful, he remarked,

how ideas of utility and the influence of custom made us submit to disfigurement. What, he asked, was more inartistic than a lamp-post, or more hideous than the barn-like appearance of many a railway terminus. The corrosion of water and gas-pipes, the disturbances of telegraphs and magnetic observations, were, he added, serious questions arising from the introduction of powerful currents into the earth; but fortunately the remedies were simple, easily attainable, and very effective.

After a few observations on electro-chemistry, Mr. Preece came to the subject of the transmission of power; his remarks thereon being as follows: The energy wasted in waterfalls is enough to maintain in operation the industries of the whole world. Great cities, as a rule, are not located near great falls; nor has a beneficent Providence provided great cities with waterfalls as, according to the American humourist, He has with broad rivers. There is but one Niagara, and we are seeing how industries are rather going to the Falls than the energy of the Falls is being transmitted to the industrial centres. The arbitrament of money is limiting the distance to which energy can be profitably transmitted. The cataracts of the Nile can be utilized in irrigating the waste lands of the upper regions of the river; but their energy cannot compete, at Alexandria, with that of coal transported in mass from England. At Tivoli, 15 miles across the Campagna, the energy of the falls is economically utilized to light Rome and drive the tramways of that city. The electric railways at Portrush and Bessbrook, in Ireland, are worked by water power; and Worcester, Keswick, and Lynton use it in this country, but on a very small scale. It is not used more, for the simple reason that there are no more falls to use. Water power is employed very extensively in Switzerland, because it is so abundant there; and in our Colonies, especially in South Africa. But it is in the United States, especially in Utah and California, that the greatest works have been installed, especially for the transmission of energy to mines. In mines electricity is invaluable. It is used for moving trams and for working hoists. It lights up and ventilates the galleries, and by pumping keeps them free of water. It operates the drills, picks, stamps, crushers, compressors, and all kinds of machinery. The modern type of induction motor, having neither brushes nor sliding contacts, is free from sparks and safe from dust. Electrical energy is clean, safe, convenient, cheap, and it produces neither refuse nor side products. It is transmitted to considerable distances. In mountainous countries the economical distance is limited by the voltage which insulation can resist; 40,000 volts are being practically used between Provo Canyon and Mercur, in Utah, in transmitting 2000-horse power 32 miles. . . . It is effecting a great economy in coal consumption in our workshops and factories. The efficiency of steam-driven shafting is known to be very poor. Scattered steam-engines and long steam-piping run away with money by their continuous waste of energy. The motor is used only when and where it is wanted; its efficiency is very high, and it costs nothing when it is idle. It can be used either for the small power required by machines and tools at present worked by hand, or for a goods locomotive of 2000-horse power such as is now being used at Baltimore. This utilization of energy at a distance is reinstating many home industries, to the great advantage of the working classes, whose time is wasted in long excursions to the factory, and whose health, morals, and well-being are not improved by herding in great numbers and by incessant association with the grievance-monger and the professional agitator.

In bringing his address to a close, the President said he had touched only lightly some of the applications of electricity; confining himself, in a very general sense, to those with which he had been personally associated. He expressed the hope that he had sufficiently impressed upon his audience the universality of electricity. Its flood-gates were opened when the Queen ascended the throne; and during her reign it had overflowed all the fields cultivated by the engineer. Though its followers were now regarded as specialists, the period was not distant when it must cease to be a speciality; its facts and tenets, its science and practice, must form the framework of the profession of the engineer. Every engineer must ultimately become an electrician; and electricity would be the most general, the most useful, and the most interesting form in which he applied the fundamental principles of energy to the wants, the comforts, and the happiness of mankind.

AMERICAN GASLIGHT ASSOCIATION.

Annual Meeting at Niagara Falls.

We learn from the last number of the "American Gaslight Journal" to hand, that the Twenty-sixth Annual Meeting of the American Gaslight Association, held on the 19th, 20th, and 21st ult., at the International Hotel, Niagara Falls, under the presidency of Mr. J. B. Crockett, President of the San Francisco Gas and Electric Company, was in every sense a success. Heavy rain had fallen on the day before the meeting; and those who arrived then were confronted by dismal weather conditions. Fortunately, however, the following morning opened bright and bracing; and under these more favourable appearances the President "called the meeting to order," as our American cousins put it, and introduced the Mayor of Niagara (the Hon. A. C. Hastings), who welcomed the members of the Association in a suitable speech, to which Mr. Malcolm S. Greenough, of Cleveland, Ohio, responded. The Secretary and Treasurer (Mr. A. E. Forstall) then made the gratifying announcement that 53 active and 14 associate members had been enrolled, which is stated to be a "record." The report of the Council was of unusual interest, one of its recommendations resulting in the election of Colonel Stedman, who presided over the twelfth annual meeting of the Association, held at Washington in 1884, as an honorary member. The next item was the presentation by Mr. Walton Clark of the report of the Educational Committee, which gave an account of good work. In connection with this subject, Mr. A. C. Humphreys stated that pledges had been received assuring to the education fund of the Association the sum of $3143 per annum over five years—the sum originally fixed by the Committee being $3000. The amount subscribed is stated to be sufficient—in fact, it is more than satisfactory. The conversation which ensued elicited the statement from General Harbison, that the authorities of Trinity College, Hartford (Conn.), had decided, mainly as the result of his influence, to establish a course in "Gas Engineering." Subsequently, the Association voted $250 per annum towards sustaining the educational work. The report of the Committee on Research (presented by Mr. Alten S. Miller) was next discussed; and the Committee were directed to continue their labours. The office-bearers for the ensuing year are as follows:—

President.—A. C. Humphreys, New York City.
First Vice-President.—G. G. Ramsdell, Philadelphia.
Second Vice-President.—E. G. Pratt, Des Moines.
Third Vice-President.—W. R. Beal, New York City.
Secretary and Treasurer.—A. E. Forstall, Montclair.

The President then delivered his Inaugural Address, which dealt at some length with municipal encroachments on private enterprise. Reference was made to the recent lease of the Philadelphia Gas-Works to a private Company; this case being cited as a proof that municipalities do not carry on their undertakings as economically and as much for the interest of the citizens at large as companies controlled by private individuals. Mr. Crockett stated that the Mayor of Boston (Mr. J. Quincy) had, in a recent letter to the City Council, advocated the granting of a ten years' contract to a company for lighting the streets; giving as his reason for so doing the "uncertainty of the operation of a municipal plant." An interesting part of the address was that in which the President dealt with the difficulties experienced by suppliers of electricity who depend upon current generated by water power at some distance from the locality served. He cited the case of Fresno, where, owing to lack of water, the people had been left without light, and the mills which were dependent on the local Company for their supply of current for motor purposes had been compelled to return to steam. He contrasted this state of things with the continuous supply of gas to which people were accustomed, any interruption of which would, he said, give rise to a "howl of indignation." He then passed on to refer successively to the use of gas as fuel, inclined retorts, the utility of acetylene as a commercial product, electric traction and electrolysis, and the educational work of the Association; concluding by expressing the opinion that the future of the gas business looks exceedingly bright. The address was referred to a Committee.

With regard to the technical business, which will, as usual, be noticed at greater length in subsequent issues, the first paper was by Mr. H. L. Doherty, of Madison. It was entitled, "How can we Make the Use of Gas more Universal;" and it led to a good debate. Dr. E. G. Love, of New York, followed with a paper on "The Loss of Illuminating Power of Twenty-five to Thirty Candle Gas when Mixed with Air," upon which diverse opinions were expressed. Mr. J. M. Rusby read a paper on "The Effect of the Depth of Fire upon the Practical Efficiency of a Water-Gas Generator;" and this was succeeded by one by Mr. Walton Forstall, bearing the title of "Notes on Mains and Main Laying." Both communications were well discussed. The afternoon sitting of the second day was occupied with the consideration of "short topics" introduced. Mr. H. L. Rice raised a good discussion on the subject of "A Gas-Engine in a Blowing Plant." Mr. Irvin Butterworth described an experiment with the Shadbolt self-enriching process; and the Secretary replied to his own question of "Can we Make all our Business Pay?" The contents of the "Question-Box" were disposed of, and the technical proceedings closed.

The general business consisted of appointing a Committee to award the Beal Medal to the author of the best paper presented at the meeting; the selection of New York for the next gathering; and the placing of the educational fund in the hands of three Trustees, with the Acting President and the Junior Past-President *ex officio*.

The attendance at the meeting was phenomenal—numbering 250; and the Entertainment Committee provided ample diversion from the business. The last day (the 21st ult.) was devoted to excursions to places of interest in the neighbourhood.

The Manufacture of Calcium Carbide.—The "Electrical Review" gives publicity to a report that Messrs. Siemens and Halske, of Berlin, are about to establish works at Klosters, Switzerland, for the manufacture of calcium carbide.

THE PRESENT POSITION OF ACETYLENE LIGHTING.

The following is an abstract translation of a lecture on the above subject delivered by Dr. Paul Wolff, in Berlin. The text has been published in two recent numbers of the "Zeitschrift für angewandte Chemie."

The most recent important advance in the lighting industries has been the discovery of the means of producing acetylene on a large scale. Moissan's laboratory researches with the electrical furnace led to the development of the technical processes for the manufacture of calcium carbide, which is the raw material from which acetylene can be obtained in quantity at a low cost. Moissan is morally the father of the acetylene industry, though the question of priority in the technical production of carbide is a controversial one, which is being argued in law suits on the patent rights in various countries. The same process was patented by different inventors in different lands. Willson's discovery of carbide appears to have been more or less of an accidental nature. But he forestalled Bullier (a collaborateur of Moissan) in the commercial development of the process of production; and thanks to him even to-day America retains her early predominance in carbide manufacture. The inexhaustible power at Niagara was called in requisition on both sides of the falls. The Electro Gas Company, the New York Carbide and Acetylene Company, and the Philadelphia Light, Heat, and Power Company have 22 furnaces on the American side; and the rather smaller Willson Carbide Works are situated on the Canadian side. The production of carbide in America at the beginning of this year was at the rate of about 10,000 tons per annum.

In Europe, carbide manufacture has until quite recently been confined to a few places. In Germany, the Kunheim Works were among the first to take it up; but they have since discarded it. The electro-chemical works at Bitterfeld made a limited amount of carbide. The industry is now, however, rapidly expanding; and new works are appearing in all directions. At Rheinfelden, in Baden, works with upwards of 8000-horse power have been constructed; while a Berlin company have secured 19,000-horse power in Norway, and a second works at Matrey, in the Tyrol, for the production of carbide. Other leading electrical firms in Germany are securing water power for the same purpose; and in Switzerland, France, Sweden, and Austria the new industry is also advancing rapidly. The production doubtless will soon begin to keep pace with the demand; and competition will prevent inflation of the price of carbide. On the other hand, a very low price must not be expected. Many of the published estimates of the cost of production are wholly unreliable, as they are not founded on the teachings of experience in the manufacture. Even those engaged in the industry estimate the cost of carbide at anything from £3 to £12 10s. per ton. If the extreme figures be discarded, there remains a considerable divergence, which is accounted for by the varying conditions of manufacture at different places.

The cost of production depends primarily on three factors—viz.: (1) The cost of power, (2) the cost of the raw materials, and (3) the output. Electricity obtained from water power is the only serviceable power for carbide production, though contrary statements are continually being promulgated. The calculations by which steam power for producing the current is made to appear sufficiently cheap, are based on erroneous assumptions. Even with the cheapest coal obtainable, competition with water power is out of the question; and on this account the manufacture appears to have been discontinued at Kunheim. It is conceivable that large steam-power works of at least 10,000-horse power could be made to pay under specially favourable conditions; but the profit would be far less than with water-power works of the same size. The cost of water-power varies considerably; but it is really cheap only when the fall is from a great height, and there is no great difficulty in controlling it, and when freight to and from the spot is not high. Many large waterfalls are useless for carbide manufacture, because of their inaccessible positions.

The cost of the raw materials is low, and the differences are seldom very great. The quality is, however, of supreme importance. The lime must not contain more than 2 per cent. of impurities, and must be as nearly as possible free from silica, magnesia, and phosphate; while the coke must contain but very little sulphur and phosphorus. The yield of carbide is actually much less than theory indicates as right. The loss of power at the turbines and transformers usually amounts to about 17 per cent.; while the electrical energy is but imperfectly utilized at the furnaces. The theoretical yield of carbide can be readily calculated. For the formation of 1 lb. of carbide, 967·6 calories, or 1·54-horse power, are required; and therefore the continuous application of 1-horse power will yield about 15·5 lbs. of carbide per day. Practically the yield per horse power per day is much lower. At the most, it is four-sevenths of the above, and in the majority of cases only three-sevenths. Therefore improvement in the manufacture, and consequently a greater yield and a reduction in price, may be expected in the future. The present bad results are largely due to loss of electrical energy in the furnace. In the first place, the mixture has to be raised from the ordinary temperature to 2700° C., which is the temperature of formation of the carbide. Secondly, a considerable amount of heat is lost by radiation or conduction; and, moreover, the mechanical mixing of the materials is never so perfect that the mixture is really homogeneous.

Many methods of overcoming these evils have been suggested. The mixture has been formed into briquettes with tar, or an easily fusible material—such as calcium chloride—has been added to it. In order to reduce the loss of heat, attempts have been made to heat the mixture before it is brought into the electric furnace. Pictet has a well-conceived scheme for the preliminary heating of the material by combustion of carbon in an air-blast and by an oxy-hydrogen furnace. The value of many of these schemes cannot be rightly estimated at present, as they have not had a sufficiently prolonged trial; but the fact is that so far in regular working a greater yield than about 8 8 lbs. of good carbide (90 per cent.) per horse power per day has not been maintained. The details of carbide manufacture cannot be discussed in the present communication; but the author hopes to return to them on another occasion. In most published accounts of the manufacture, trivial points are dealt with at great length, while really important matters are almost completely ignored. This is due to the writers having only a theoretical knowledge of the subject, as those engaged in the industry observe secrecy as to their experiences.

The following shows the cost of production of a ton of carbide under the specially favourable conditions which obtain at the Vernier Works, near Geneva:—

2240 lbs. of lime	cost	22·35 frs.
2016 lbs. of carbon		45·72 ,,
Electrical power		40·64 ,,
Pulverizing, renewal of electrodes, &c.		50·81 ,,
Total		159·52 frs. = about £6 7s. 6d.

The conditions in this case are uncommonly favourable; but if the general expenses, management, interest on capital, &c., are added, it will be seen that the total cost of production of carbide must amount to from £7 10s. to £10 per ton, according to local circumstances. If, moreover, the cost of packing the product in air-tight iron drums and freight be added, it will be found that the selling price must be from 1·90d. to 2·20d. per pound wholesale, or from 2½d. to 2¾d. per pound retail.

The apparent simplicity of production of acetylene by merely bringing carbide and water in contact, and the very high illuminating power of the gas, led to all manner of extravagant hopes when carbide was first made in quantity. Catch-titles—such as "Light of the future," "Every house its own gas-works"—were freely used; and acetylene was referred to as the ideal illuminant. As a result of the deceptive simplicity of generation, numbers of persons with no technical qualifications started in the new industry. In Germany, no fewer than 700 patents have up to the present time been applied for in connection with it. Among the inventors may be found priests and butchers. The result of the intrusion of such people, devoid of all technical knowledge, into the industry was that generators were constructed in which the simplest conditions of safety were neglected; and explosions, frequently attended by lamentable consequences, became common. Then the impression gained ground that the use of acetylene was invariably attended with great danger; and restrictive measures were adopted in many places which prevented the legitimate application of the gas. These measures have lately been so modified that they are no longer absolutely prohibitive.

It is now generally recognized that the toxic properties of acetylene are less marked than those of coal gas. Acetylene, when properly purified, is a pure hydrocarbon; whereas coal gas, and in a still greater degree water gas, derive highly toxic properties from the carbonic oxide which they contain. The objection to acetylene which continues to hold force is that it is liable to cause explosions. These explosions fall into two classes—viz.: (1) Those due to carelessness and to the same causes from which coal gas explosions arise; and (2) those attributable to the peculiar chemical and physical properties of acetylene.

The first class of explosions include those arising from the firing of a detonating mixture of acetylene and air. The range of such explosions is greater than with mixtures of coal gas and air, because the acetylene mixture is explosive within far wider limits of composition. Thus, only when air contains from 8 to 28 per cent. of coal gas is the mixture an explosive one; but air containing from 3 to 82 per cent. of acetylene will explode. Therefore greater care is necessary in the manipulation of acetylene generators than of coal-gas plant, in order to prevent admixture of air with the gas. Open flames should on no account be used in the vicinity of acetylene generators or gas-holders. The danger which thus appears to be so great, is in reality considerably modified by two facts—namely, (1) that the consumption of acetylene, owing to its very high illuminating power, is very much less than that of coal gas; and (2) that the odour of acetylene is a more penetrating one than that of coal gas, and consequently leakages may be more readily detected. Explosions of the class now under consideration can therefore only ensue from gross inattention; and relatively they should not be more common than those from coal gas or petroleum.

The second class of explosions are those which result from the endothermic character of acetylene. Theoretically, every endothermic gas is liable to the occurrence of a decomposition

which is propagated with such speed that it must be regarded as an explosion. In practice, fortunately, the heat liberated by the decomposition is largely expended externally, and that which remains available for the spread of the decomposition is very little. Actually, Berthelot has shown by experiment that acetylene under ordinary pressure is not in itself explosive—that is to say, decomposition of the gas initiated at one spot does not spread throughout the mass. Under increased pressure the conditions change, for acetylene becomes an explosive under 2 atmospheres pressure; and under 38 atmospheres—by which it is liquefied at 32° Fahr.—its decomposition causes a pressure of 5500 atmospheres, or it has about the same explosive force as gun-cotton. Some explosions can therefore be attributed to working consciously with the compressed or liquefied gas, and others to unintentional compression of the gas in the generator owing to the latter being of faulty construction. In the early days of the acetylene industry, many attempts were made to compress the gas in order to have it in a readily portable form for such purposes as railway carriage lighting. In France and Switzerland, some railway cars were actually lighted from reservoirs of compressed acetylene. It has been shown, however, that the compressed gas may be very easily exploded; and therefore its use for these purposes has been discontinued. But it has also been shown that the explosiveness may be modified by admixture of other gases; and on the Prussian railways a mixture of oil gas and acetylene is compressed to 6 atmospheres, and employed for lighting carriages. This mixture has about three times the illuminating power of simple oil gas.

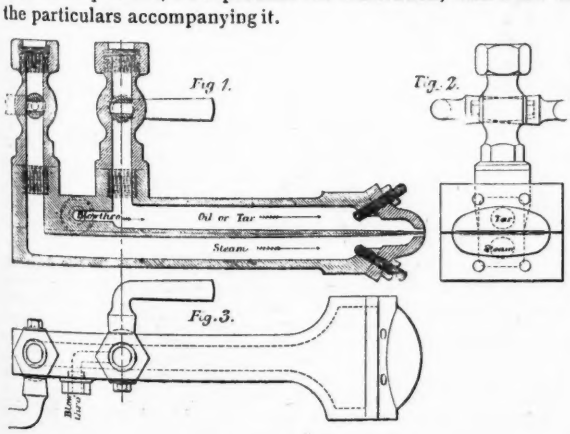
Explosions were at first also feared from the explosive compounds which acetylene forms with certain metals—especially copper. The use of copper and its alloys in acetylene apparatus was therefore forbidden, until it was demonstrated that the copper compound is not formed by the action of acetylene on alloys of copper; nor even by its action on pure copper, when the conditions are those which prevail in acetylene generators. The police regulations in Germany now permit unconditionally the use of brass or other copper alloys in apparatus for acetylene under ordinary pressure. In fact, acetylene under low pressures is not more dangerous than other gases. Bad apparatus and faulty service make it dangerous.

The construction of acetylene generators appears at first glance to be a very simple matter. Gases had been generated in laboratories for many years from a solid and a liquid, by means of Kipp's apparatus; and the early acetylene generators were merely modifications of this. But difficulties ensued, because the acetylene reaction does not occur with the same regularity as the reactions by which carbonic acid or sulphuretted hydrogen are obtained in Kipp's apparatus. The first portion of water which reaches the carbide produces a brisk evolution of gas; but after a while a coating of lime, arising from the decomposition, is found on the carbide, and water has to penetrate this in order to reach the unattacked carbide. The evolution is then less brisk; but soon the water collected on the coating breaks away the latter, and a large quantity of water suddenly gains access to the carbide within and causes a violent generation of gas. The generation thus proceeds very irregularly, and great variations of pressure are observed.

(To be continued.)

THE SHURER TAR-BURNER.

A recent number of "Engineering" contained an illustrated description of a tar-burner adapted by Mr. E. Shurer, the General Manager of the Fairfield Shipbuilding Yard at Govan, for firing boilers. As the burner is useful for other purposes than the one in question, we reproduce the illustration, with a few of the particulars accompanying it.



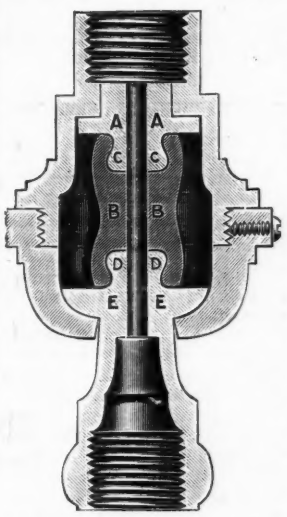
A large store tank, capable of holding 1400 gallons, is conveniently placed, and is fitted with a small steam coil for keeping the tar in a sufficiently liquid state to ensure its pumping freely. From this tank the fuel is pumped into a small supply-tank placed inside the building where the appliance is used, and above the level of the burner. In this tank there is also a small steam-coil. The tar runs from the supply-tank directly into a jointed coupling, fixed to the front of the boiler, into which also is led a steam-pipe for supplying the requisite pressure. From this coupling the tar fuel and steam pass in two ¾-inch pipes down to the burner itself. The form of the burner is clearly shown in figs. 1, 2, and 3; the blow-through being fitted to clear out any tar which may gather while the appliance is not in use. The steam-valve is first opened and the burner cleared of any obstruction. The tar supply is then turned on, and the light applied.

This arrangement of burning liquid fuel has been applied for some time to one of the ordinary boilers working the hydraulic machinery for the shipbuilding works, and a comparison has been made as to the difference in cost of working with tar as compared with coal. In the latter case, including the firemen's attendance, the cost works out at £7 18s. 6d. a week per double shift; and, taking the same time with the refuse tar as fuel, the cost works out at £5 19s.—thus showing a considerable saving. The only difficulty in the way of using the liquid fuel is that it is necessary to raise a certain amount of steam on the boiler so as to get the steam-jet. The weight of coal used for 116½ hours is 15 tons, and that of tar less than 9 tons; the former fuel costing 10s. per ton, and the latter 5s. per 100 gallons.

BALL-JOINT FOR ACETYLENE GAS-FITTINGS.

The necessity for having a ball-joint on all gas-fittings liable to be moved in any way after they have been put up, is too obvious to need emphasizing; but the want of such a joint specially suitable for use with fittings for acetylene gas has been distinctly felt since the new system of lighting has advanced in public favour. One of the most noticeable properties of acetylene gas is its penetrating and searching nature; and many consumers have preferred, in the case of appliances used for this gas, to have a stiff top, with the attendant dangers of damage to the fitting and breakage of glass, &c., necessarily entailed, than run the risk of gas escaping from a moveable joint.

Messrs. Falk, Stadelmann, and Co., however, have introduced a new joint which renders this no longer necessary. With this invention the gas does not enter the body of the joint in the usual way, and is prevented from coming into contact with the ball bearing itself—the most vulnerable part of the fitting. This object is attained by means of a simple contrivance shown in the accompanying diagram. The part marked A is ground into an absolutely gas-tight bearing, and is connected by means of a cylindrical piece of india-rubber marked B to the half ball at the bottom of the joint; thus forming a perfectly sound passage for the gas direct from the supply-pipe to the rod of the chandelier or other lamp. This pliable connecting piece is manufactured from a particular class of rubber of the finest quality, which after much experimenting has been found to remain unaffected when brought into contact with the gas. Only a very limited portion of its surface—viz., the interior of the small passage between the two boxes C and D—is, in fact, in any way exposed thereto. The additional precaution is, however, taken of having the half ball E particularly well ground in, which renders the movement of the joint smooth and regular, and at the same time protects the outside of the rubber from heat and dirt. The joint is adapted for all kinds of gas-fitting work, whether acetylene is used or not. It is made in various sizes, and is of neat appearance.



Lass's Analysis of the Metropolitan Water Companies' Accounts.—The eighteenth annual issue of the above-named work is now ready. It contains analyses of the accounts of the eight London Water Companies for the year ending Dec. 31, 1897, or March 31, 1898, according as they are made up to one or other of these days. The tables are uniform in their arrangement with those of previous issues.

Utilization of Water Power in Switzerland.—According to "L'Electricien," thirty-five new schemes for the utilization of water power were sanctioned by the authorities in Switzerland last year. Seventeen of them were for lighting, four for the transmission of power, and fourteen combined lighting and transmission schemes. Most of them were small; and this fact is regarded as supporting the statement that shortly every little village in the Republic will be lighted and supplied with power for its smaller industries by electricity developed from water power in the vicinity.

STOPPING LEAKS IN COAL GAS AND ACETYLENE MAINS.

The introduction of acetylene has drawn renewed attention to the loss of gas which occurs through unsound mains, because acetylene is distributed usually at a higher pressure than coal gas, and because it dissolves more freely packing materials of a greasy nature. The loss is said to amount in the coal-gas mains in Germany, on an average, to about 7 per cent. of the gas made. The unaccounted-for gas in Berlin is equal to the consumption of a fairly large town, such as Stettin. The loss of acetylene in distribution may usually be taken to be about 15 per cent.

It is, however, well known that some of the unaccounted-for gas is in reality due to change of temperature, of which the effect on the volume of the gas cannot be computed with certainty. An attempt to stop automatically the actually leaky places in services has been made by Herren Billwiller and Rosenthal. They impregnate the packing material with some substance on which constituents of the gas act and cause an increase in its volume. The expansion of this substance, when the gas comes in contact with it, thus renders any imperfect joints tight. The constituents of the gas which react with the substance used are the sulphuretted hydrogen and ammonia, which occur as impurities in both coal gas and acetylene. For instance, if the impregnating agent be an alcoholic solution of ferric chloride, the oxidizing action of the salt may produce more or less acetic acid, which will combine with iron to form the acetate. The unaltered ferric chloride will react with the impurities, especially when the sulphuretted hydrogen is in excess, according to the following equations:—

$$Fe_2Cl_6 + 3\,H_2S = Fe_2S_2 + 6\,HCl$$
$$6\,HCl + 6\,NH_3 = 6\,NH_4Cl.$$

The final products, therefore, will be ferric sulphide and ammonium chloride, which will have about twice the weight, and occupy about twice the volume, of the original ferric chloride. An alcoholic solution is advantageous, because the alcohol readily evaporates and leaves the salt in a state of very fine division. Other salts may be used in place of ferric chloride. An excess of the salt will serve to stop leaks which may develop subsequently. According to the "Zeitschrift für Beleuchtungswesen," this method of securing sound joints has been successfully applied to long stretches of mains. It is evident, however, that it would not be fully effective in cases where the gas was properly purified.

AUTOMATICALLY RECORDING THE WATER-LEVEL IN RESERVOIRS.

At a recent Meeting of the Bristol Association of Engineers, Mr. J. A. M'Pherson submitted some notes on "Regulating and Recording Apparatus for Reservoirs, Gauge-Weirs, and the Flow of Water." The method of electrically recording the level of water in reservoirs or tidal basins was first dealt with, and the means of transmitting and registering the fluctuations of water described. Diagrams were shown illustrating the mechanical and electrical action of the apparatus, consisting first of a transmitter at the reservoir, where a float rising and falling with the water communicates motion by means of gearing to an insulated cam-wheel, which in turning engages a tumbler, causing it to revolve until the long arm strikes a commutator, throwing it to one side or the other into metallic contact with one pole of a local battery—the direction of the current being thereby alternated for a rise or fall of water, according to the motion communicated by the gearing. The cam in revolving sets up a rubbing contact between platinum springs making connection to the line wires; while the tumbler, in falling over into equilibrium, makes a contact and completes the circuit. The current passes from the transmitter through the line wires to a recording instrument at the pumping-station or the engineer's central office, and there actuates a relay and completes the circuit of the local battery in either direction through electro-magnets for a rise or fall. Soft iron cores are attracted by whichever magnet is excited, and cause the engagement of pawls and a toothed wheel, moving a rack and pencil-carrier to obtain a diagram record on a clockwork drum, while a second wheel carries a hand that gives a constant reading at sight, upon a dial, of the fluctuations of the reservoir. A description was next given of an instrument for recording the flow of water over gauge-weirs, by means of an adaptation of the cam movement, calculated upon the formula for discharge; a record being obtained at any moment of the actual rate of flow in gallons or cubic feet, while by means of a planimeter or otherwise the total quantity registered upon the diagram in a given time may be calculated.

The Flash-Point Test for Lubricating Oils.—The "American Engineer" recently contained a table showing the flashing-point of hydrocarbon oils used as lubricants. The lowest figures are 330° Fahr. for ordinary purposes, and 350° Fahr. for cotton mills and places where there are inflammable materials; while for cylinder oils, 500° Fahr. is the lowest point that is generally safe.

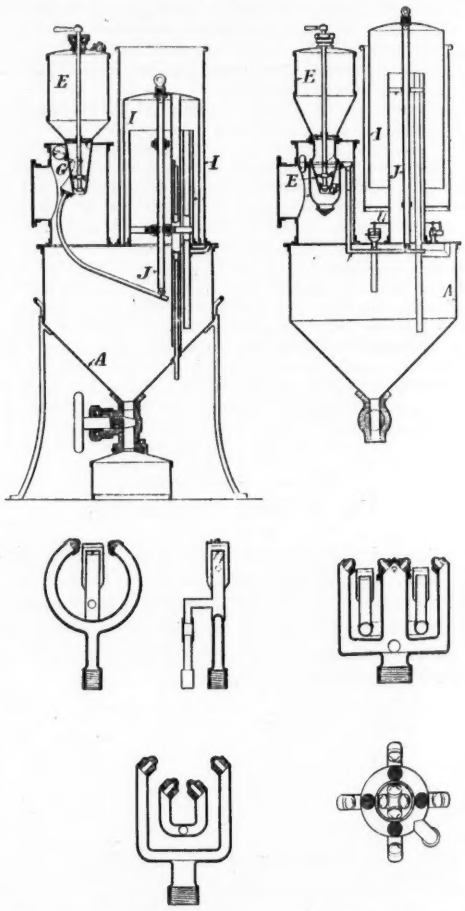
REGISTER OF PATENTS.

Incandescent Burners for Producer or Water Gas.—Dymond, J., of Crediton. No. 22,065; Sept. 25, 1897.

This invention has reference to a construction of burner whereby ordinary producer gas or water gas can be employed, without being enriched by hydrocarbons. The patentee finds that, in order to obtain satisfactory results, it is necessary that the producer gas shall issue from a small nozzle into a vertical tube provided with an air inlet or inlets arranged above the nozzle and below the outlet end of the tube, which should be placed at a suitable distance above the free end of the gas-exit nozzle; also that it is advantageous, in cases where the burner is subject to draughts, that the air-way through the bottom of the burner gallery, and communicating with the bottom of the chimney, should be so constructed that the amount of air capable of passing through it should be less than is the case in the ordinary incandescent burners commonly used. He then describes such a burner, comprising "a vertical tube, into the lower part of which the gas to be burnt is admitted through a small orifice or nozzle and is mixed with air, which enters the tube through an opening or openings of suitable area and disposed at a suitable distance above the gas-inlet." This vertical tube may be made in parts arranged one above the other, with an air-way between their adjacent ends, and a gas-exit nozzle or orifice arranged to admit gas to the lower part of the tube at a point below the air-way.

Generating and Burning Acetylene.—Ageron, J. A., and Wirth, L. P., of Paris. No. 22,648; Oct. 2, 1897.

The claims for this invention are for apparatus for the generation and combustion of acetylene gas, in which the gas produced by the fall of carbide of calcium into water passes through a bellows pressure-regulator and reaches the burners which are also provided with a central delivery-tube for oxygen or ozone having its outlet opening below the acetylene gas flame. The gas-producing apparatus is termed an "acetylogene," and comprises a water-vessel A, a gasholder formed of a cylinder T fixed over the vessel and of a bell or sliding cylinder I, and an automatic distributing apparatus for the carbide. This comprises a funnel or hopper E, with a register valve or distributer, and an oscillating lever

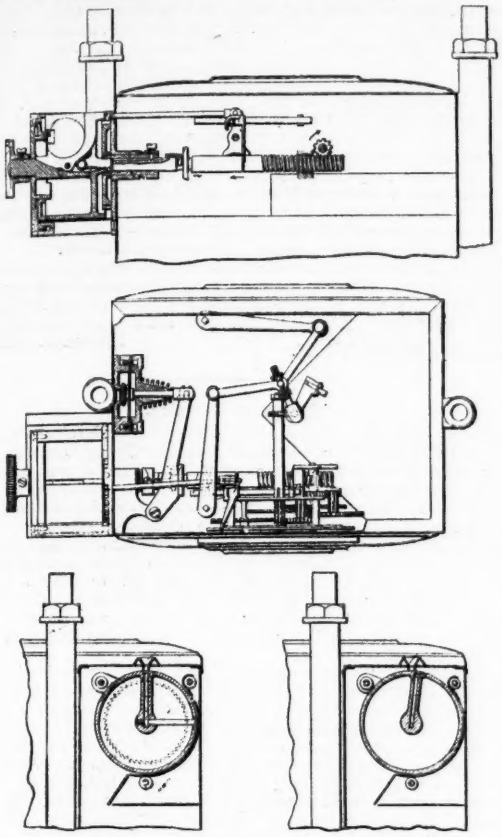


G pivoted on the funnel forming a stopper or shutter for the delivery aperture, and provided with a long arm on which the sliding cylinder or bell of the gasholder acts, so as to allow the carbide to fall into the water in the vessel A proportionally as required. This funnel or hopper E carries an oscillating box, with a stopper or shutter adapted to close its delivery aperture, and a fixed shutter adapted to close the lower opening of the box, in combination with a lever fixed to the box, and on which acts the sliding cylinder or bell I of the holder.

The burner referred to produces converging jets of acetylene gas with a central delivery of oxygen or ozone below the flame, as illustrated; and there is a pressure-regulator interposed between the acetylene producers and the burners comprising a bellows, the upper end of which is fixed and the lower end of which is jointed to the end of a lever fixed to the plug of the cock which controls the admission of the acetylene gas into the bellows.

Coin-Freed Meters.—Simpson, S., of Exeter. No. 22,830; Oct. 5, 1897.

One method of carrying this invention into effect when applied to a dry gas-meter (as shown in the engraving), consists in mounting a driving pinion upon a shaft or spindle geared to any convenient pinion or wheel of the ordinary index of the meter, so as to turn with it. In line with the driving pinion, but at right angles to it, is a measuring shaft carried in suitable bearings and capable of rotary and also of longitudinal movement; and upon the shaft is a long worm (which may have a single or multiple thread) gearing with the driving pinion—the worm being of such length as to remain in gear with the pinion although the measuring shaft is moved a considerable distance longitudinally. The measuring shaft is connected by a lever or other suitable means with the valve controlling the supply, in such manner that, by a longitudinal movement of the shaft in one direction or the other, the valve is opened or closed.



On the insertion of a coin, the measuring shaft with its worm is rotated (by a coin-operated device to be hereafter described); and the driving pinion being held stationary—owing to the supply being cut off—the worm and shaft are traversed forward by a screwlike action against the teeth of the pinion, which in this case acts as a nut. By this means the valve is opened, and the gas passes through the meter.

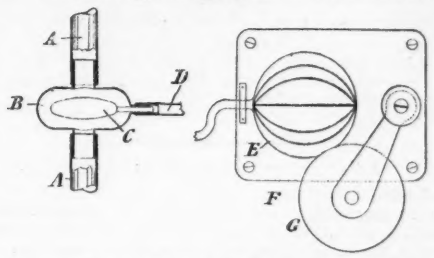
The meter being thus set in operation, and the driving pinion rotating, the measuring shaft is moved in the opposite direction (the worm in this case being operated after the manner of a rack); so that, as the gas paid for is consumed, the valve is gradually closed. Thus the quantity of gas supplied in exchange for the coin is determined by the amount of longitudinal travel of the measuring shaft.

The coin-operated device for rotating the measuring shaft consists of: A toothed or notched measuring disc or wheel connected to the shaft by a feather or other means, so that the shaft may move endwise while the disc or wheel remains stationary; a coin holder or receiver revolubly mounted on the shaft, and having a radial slot adapted to receive the coin from the shoot; a spring pawl lever in the slot, which, under the action of the coin, is thrown into engagement with the teeth or notches of the measuring disc or wheel; and a stationary cam-plate having a cam-like ridge or flange projecting therefrom—the flange or ridge extending in a circular direction, and having an inclined end. The cam-plate is so arranged with relation to the coin-holder and to the coin-shoot that, when a coin is inserted—falling from the shoot into the slot of the coin-holder, and the coin-holder being rotated by a handle upon the outside of the meter-casing—the coin is carried round some distance, until (coming in contact with the inclined end of the cam-like ridge or rim) it is moved edgewise in the slot. This forces the spring pawl lever into engagement with the measuring disc or wheel, which is thus carried round (rotating the measuring shaft, and opening the valve as previously described), for an angular distance depending upon the extent of the rim or flange of the cam-plate. After this the coin falls from the slot in the coin-holder, and passes into the usual coin box or receptacle. The measuring shaft is connected to a pointer, which indicates upon the index dial, or upon a separate dial, the quantity of gas prepaid.

Opening and Closing Supply-Pipes from a Distance.—Becker, N., of Frankfort-on-the-Main. No. 24,807; Oct. 26, 1897.

This invention has for its object an arrangement for opening and closing low-pressure supply-pipes in place of the ordinary taps from a point at any distance from the places of consumption.

The device consists of a suitably-shaped enlargement of the supply-pipe A or a box B inserted therein, in the interior of which enlargement or box a flat india-rubber bladder C, capable of being inflated by air pressure, is mounted by means of a gas-tight joint. The latter is connected with a supply-pipe D, provided at some suitable point of the room in question with a device E, for introducing compressed air into the bladder C. In the drawing, this device consists of an india-rubber ball,



filled with compressed air, and mounted in a recess in a plate F in such a way that, by passing over it a disc G pivotally mounted on the plate, the india-rubber ball may be compressed as desired. The air thereby discharged from the ball passes through the pipe D into the bladder C, and inflates it; thereby closing more or less the pipe A, so that the supply of gas conveyed therein is entirely or partially interrupted.

Converting the Energy of Coal into Motive Power for the Combined Working of Gas-Engines and Gas-Generators.—Mond, L., of Regent's Park, W. No. 27,257; Nov. 20, 1897.

This is a modification of the inventor's previous patents—No. 16,781 of 1895 and No. 28,588 of 1896—in which he proposed to utilize the hot exhaust gases issuing from gas-engines for producing a mixture of air and steam to be employed in converting coal into gas for use in the engine. He now claims as an improvement the conversion of the energy of coal into motive power by the combined working of gas-generators and gas-engines, by gasifying the coal in gas-generators, exploding the gases so obtained in gas-engines, and returning part of the exhaust gases of the gas-engine to the gas-generator, and passing them (in admixture with air or air and steam) through the incandescent fuel, whereby the carbon dioxide contained in the exhaust gases is re-converted into carbon monoxide, which is again used to produce motive power in the engine.

APPLICATIONS FOR LETTERS PATENT.

21,815.—Seddon, C. A., "Igniting combustible or explosive gas mixtures." A communication from C. Killing. Oct. 17.
21,851.—Jenkins, H. C., and Lowden, T. C., "Manufacture of producer gas." Oct. 17.
21,977.—Eisner, W., "Water-meters." Oct. 19.
21,988.—Wild, M. B., and Wight, W. D., "Conveyor and elevator bands." Oct. 19.
21,994.—Scott, M. E., "Gas cooking-stoves." Oct. 19.
22,019.—Watson, J. H., and Dawson, J., "Acetylene gas lamps and generators." Oct. 19.
22,020.—Lake, H. H., "Manufacture of gas." A communication from F. L. Slocum. Oct. 19.
22,041.—Sutherland, J. C., "Gas-meters." Oct. 19.
22,054.—Bray, G. & J. W., "Burners for acetylene gas." Oct. 20.
22,110.—Schneeweis, J., "Acetylene generator." Oct. 20.
22,143.—Hirt, G., and Horn, G., "Gas and other like engines." Oct. 21.
22,205.—Nash, L. H., "Water-meters." Oct. 21.
22,228.—Barratt, F. W., "Acetylene lamps." Oct. 22.
22,246.—Dürr, F., "Gas-engines." Oct. 22.
22,272.—Williamson, A. D., "Generating, purifying, storing, and distributing acetylene gas." Oct. 22.
22,277.—Müller, A., and Gareis, O., "Automatic igniters." Oct. 22.
22,301.—Smith, S., "Acetylene gas-lamps." Oct. 24.
22,330.—Döllner, G., "Purifying acetylene." Oct. 24.
22,341.—Francetti-Schieroni, E., "Acetylene lamps." Oct. 24.
22,412.—Adams, R. B., "Gas-stoves." Oct. 25.
22,463.—Peck, W., "Internal combustion engines." Oct. 25.
22,478.—Hateley, H., "Combined deflecting shade and mantle protector for incandescent lighting." Oct. 26.
22,572.—Ireland, W., "Acetylene gas generators." Oct. 27.
22,626.—Wiles, J. L., "Internal explosion engines." Oct. 27.
22,628.—Marks, G. C., "Gas and oil engines." A communication from E. Spitz. Oct. 27.
22,649.—Hunter, J. W., "Gas or oil engines." Oct. 28.
22,701.—Roubleff, A., "Self-igniters for incandescent and other gas burners." Oct. 28.
22,734.—Dossetter, W. J. A., "Acetylene gas generators." Oct. 29.
22,736.—Scott, W., "Guard for incandescent gas-mantles." Oct. 29.
22,737.—Strickland, F., "Internal combustion engines." Oct. 29.
22,783.—Bernstein, M., "Automatically lighting incandescent gas-burners." Oct. 29.
22,784.—Lafond, J. B., "Manufacture of water gas." Oct. 29.
22,796.—Hamrick, H. M'M., and Miller, W. S., "Gas or vapour burners." Oct. 29.
22,797-8.—Hamrick, H. M'M., "Gas or vapour burners." Oct. 29.
22,804.—Thomas, T. C. J., "Lanterns for gas-burners and the like." Oct. 29.
22,807.—Lake, H. H., "Incandescent gas-mantles." A communication from H. G. Semadeni. Oct. 29.

Gas-Meter Rents at Levenshulme.—At Levenshulme, the price charged for gas by the Manchester City Council is 2s. 9d. per 1000 cubic feet; but for more than forty years, there has been a rental of 1s. per quarter for meters. An intimation has been sent to the consumers that, from the end of the September quarter, no meter-rent will be charged, which concession will represent a saving of 4s. per annum to about 500 householders.

CORRESPONDENCE.

[We are not responsible for the opinions expressed by correspondents.]

Retorts.

Sir,—In reply to "A Less Fortunate Brother," in your issue for Sept. 27 last, I may state that, while the results were being obtained at the rate of 8000 feet per mouthpiece, as mentioned in "Wayside Notes," the retorts were charged six times during the 24 hours, and the make per ton was from 10,500 to 10,600 cubic feet.

T. S. Cleminshaw.

Colombo, Ceylon, Oct. 20, 1898.

An Objection to Sulphate of Ammonia.

Sir,—An agricultural friend informs me that one objection to sulphate as ordinarily supplied from the gas-works is that it is not in a sufficiently fine state of division to admit of distribution by means of drills, which is the cheapest way of effectively spreading artificial manures. It is thus placed at a disadvantage as compared with other manures that are specially prepared to meet this requirement. This point is worthy of the attention of the Sulphate Committee; and I should be glad to know if any of your readers have been asked to supply sulphate in a finely ground condition, and if so the means adopted for its preparation. I am told that at some gas-works the sulphate is screened, if required; and that this practice was commenced as a means of meeting a demand for coarsely powdered sulphate.

N. H. Humphrys.

Salisbury, Nov. 4, 1898.

Extension of Workmen's Breakfast Time.

Sir,—With regard to the recent alteration of breakfast time allowed in the London district, I do not know whether the majority of engineers and managers will take this as a new departure for the benefit of the working class; but I think honour belongs to whom it is due. Nearly twenty years ago Mr. W. H. Belton, the then Manager of the Wellington (Salop) Gas Company, recognizing that the half-hour system was too short a time for men to have their meal and do justice to themselves, established the three-quarters of an hour meal time there; and the arrangement existed when, in March, 1886, the writer entered the Company's service under Mr. Belton. It was in vogue when he left on Oct. 1, 1897, which was 11½ years. During his time, the men always appreciated this little favour, in comparison with men employed at other manufactures in the district, who could be seen running as if they had not many minutes to live.

This coming to some of the London works from works scarcely large enough for laboratory purposes, shows that the older managers were not unmindful of their workmen's welfare.

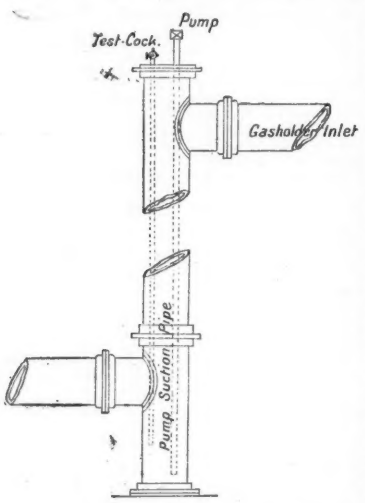
I might remark that the Mr. Belton I here refer to was the father of the Engineer and Manager of the Shrewsbury Gas Company, and of Mr. J. C. Belton, late of Redhill. Both these gentlemen could say a good deal in favour of the scheme if they wished.

W. H. Whitehouse.

Ludlow, Nov. 3, 1898.

Faulty Syphon Pumps.

Sir,—Upon reading the letter of Mr. T. D. Hall, in regard to the above, in the "Journal" for the 1st inst., I thought perhaps the plan I have had in use for nearly forty years might be of interest. In all our dripboxes—whether in use for gasholder inlets and outlets or for street mains, I have a small pipe (½-inch) which I designate a "test-pipe," fixed by the side of the pump suction pipe. This test-pipe is fixed short of the suction in the dripbox, by about half of the space between the bottom of the suction and the main inlet or outlet. The test-pipe reaches to the surface to about the same level as the suction pipe. A cock is fixed on the top for our gasholder and an iron plug or cap for security in the street main drips. By means of the cock or plug, the man in charge of the syphons can in a moment tell if there is an approach to danger; and he would act accordingly—knowing also that if no gas came, there must of necessity be a certain amount of water requiring to be pumped out.



The advantage I have found in this plan is that the man, instead of trying with the pump every day or week, as he may have had instructions, has simply to open the cock. One other advantage is that if a stoppage at any time occurs on the works, it can be discovered in a moment whether or not the inlet of the gasholder is at fault.

S. Cross.

Abergavenny, Nov. 3, 1898.

The Disfranchisement of the Chairman of the Birmingham Corporation Gas Committee.

Sir,—As a former official of the Birmingham Corporation Gas Department, I am surprised to find that comparatively little notice has been taken of the shameful treatment accorded to Mr. Alderman Pollack, the well-known and popular Chairman of the Birmingham Gas Committee, as concisely stated in your issues of the 18th and 25th ult.

It appears to me such a gross indignity calls for some more general expression of sympathy or indignation (one hardly knows which to suggest) than has been expressed. After such an active and praiseworthy public life as Mr. Pollack has lived for so many years as Alderman, Mayor, Magistrate, and Chairman of different Committees, &c., it must be most mortifying to him to be suddenly disfranchised by so egregious a blunder as that pointed out by you. With reference to his work in the Gas Department, as is so keenly felt in Birmingham, his loss is nothing less than a calamity. True, the numerous plans and schemes he has so successfully piloted through the Council are being carried out exactly as he had arranged. Yet for him to have no voice in these matters at such a moment, is indeed preposterous.

It would ill become me to speak of his work upon the Gas Committee, which is so well-known. Suffice to say the Birmingham Corporation Gas-Works are widely known to be up-to-date in everything worth being so. Labour-saving appliances there introduced by the able Chief Engineers, Mr. Henry Hack and Mr. Charles Hunt, have received from time to time due notice and prominence in the "Journal." It must be borne in mind that it is not merely labour-saving which Mr. Alderman Pollack has always had in view, so much as the reduction of exhaustive manual labour, whether arising from heat, dust, or chemical processes. To the Gas Committee itself and the Secretary, Mr. Edwin Smith, the sudden deprivation of the Chairman of his office will be most acutely realized. That men of all political parties and creeds speak of this disfranchisement as nothing less than a disaster for the Gas Department is sufficient in itself. To Mr. Alderman Pollack it must be a source of gratification to feel that, though separated from the work he loved and engaged in so ardently, it will be carried on just as he desired—only, of course, minus the advantage of his wide experience and businesslike tact.

The simple resolution of the Overseeers, expressing their regret for the occurrence which has wrought such a catastrophe, is insufficient altogether for such a case, although probably it will be all that is forthcoming. The wish that some legal remedy would be found is now hopeless.

Edward A. Harman.

Huddersfield, Nov. 3, 1898.

Tramway Traction.

Sir,—Mr. J. A. Baker has recommended the "conduit" system in his report to the Highways Committee of the London County Council; but the heavy expenditure necessary for the installation of this system, and the excessive cost of maintenance, are shown in the reports of the various deputations who have visited the Continent and the United States. The London County Council do not appear to be favorable to the "trolley," as it is dangerous, unsightly, and more or less unworkable in the busy narrow streets of London, besides causing such deadly havoc to gas and water pipes; and I hardly think that they will recommend a system which has been so universally vetoed by Provincial Corporations as the conduit. Now is the time, therefore, to bring the merits of the gas-motor cars prominently before the public and those interested in gas undertakings generally.

It seems to me that too much stress is put upon the contrast between horse and electric traction; forgetting that almost any form of mechanical propulsion of cars is more desirable than horse, because a uniform speed is maintained, a quicker and more frequent service is permitted, and, as a natural consequence, expenses per car-mile are reduced. It is, however, absurd to claim these as special advantages of electric traction only; and instead of always dwelling on æsthetic considerations by one partisan or another, it would be more useful to scrutinize closely the capital outlay and the costs of running. Unfortunately statistics under the latter head are few and far between; but those available form interesting and instructive reading. The experiences of the Dover Corporation point to 0·95 of an electrical unit as the amount of power necessary to run a car 1 mile; and as electricity is 3d. per unit at Dover, this works out at 2·85d. per mile for energy alone, as against a little under 1d. for power on the gas-motor cars at Trafford Park. And despite this heavy cost of power at Dover, a profit of £1300 has been cleared. It is, however, a very simple question of arithmetic to estimate how much cheaper gas traction would have been, and how much more profitable. "Lightning" gives comprehensive tables every week of the charge per unit of electricity for power purposes, and the average runs out at about 4d. per unit; so that the generality of towns adopting electric traction would find their energy bill a trifle high, without taking into consideration the heavy capital charges involved in an electrical installation of either the trolley or conduit system.

As mentioned in your article, another point which is so frequently lost sight of in dealing with the cost of electric traction, and which cannot be too strongly emphasized, is the leakage of the electricity, which is so destructive to gas and water mains; and though the damage is only apparent after three or four years' running, the pipes have *then* to be renewed, and the cost must be added to the expenses of the electrical systems. This is not a fanciful picture, as the bitter experience gained in America has clearly and definitely substantiated the dangerous nature of this most virile agent. It was also referred to in strong terms at the meetings of the British Association held at Bristol lately; and besides the corrosion mentioned by several eminent experts, Professor Silvanus P. Thompson showed that the escaped electricity was powerful enough to altogether disorganize the instruments in observatories even at some miles distant. Those who have adopted electricity as their motive power have not fully grasped their liabilities, but are hugging themselves in the belief that the present increase of traffic is due solely to the adoption of this method of traction, that the expenses will always be normal, and that the future holds nothing but good. A sad awakening awaits them.

At various times you have referred to the successful working of gas-motor cars at Blackpool; but the pulses of gas companies, and the corporations owning gas-works, have not yet been stirred into action. The operations at Blackpool, however, and the experience gained at Trafford Park, Manchester, prove that no system can be so easily installed, or worked so cheaply, as gas traction; and in view of the fact that electric lighting is making such rapid strides in this country, it behoves gas engineers to show active interest in a movement calculated to do so much for the uniform working of their plant. According to Mr. Hersey's letter, I notice that during the past two years' working at Blackpool the cars have run 250,000 miles, and carried 1,150,000 passengers; and the gas

consumption per car-mile, including that used in the compressing station, is only from 33 to 35 cubic feet for 52-passenger cars, which represents a cost of less than a 1d. per car-mile. In no other system is the cost of energy so low as this; and when it is remembered that the capital charges of electrical installations are necessarily so heavy, it is evident that the working expenses of either the trolley or conduit system must be much higher than that of gas-motors.

Although the Birmingham Corporation reported in favour of the conduit system, yet their deputation in April, 1897, were much impressed with the working of the gas-cars at Blackpool, and said: "Even as the cars stand, however, the system appears to be an eminently practical one, and likely to be very successful on routes suited to such a form of motive power. . . . Your Sub-Committee saw this [the use of supplemental gearing] in satisfactory operation ascending a sharp gradient over the Railway Bridge near St. Anne's Station." And I understand that since that date important improvements have been introduced into the gas-cars to increase their efficiency and reduce the gas consumption.

The "JOURNAL" circulates among so many gas engineers, that I hope the further details of operating tramcars by means of gas-motors and the extension of the system to Neath and other lines in the West of England, will commend themselves to every gas engineer who wishes to increase his output and keep it normal both day and night. Hitherto the gas world has viewed the operations of gas-driven cars with apathy, if not with suspicion; but now that the system has proved a success, it should lend its aid in the propagation of this simple, cheap, and efficient means of tramcar propulsion.

Nov. 4, 1898. A BELIEVER IN GAS-TRAMS.

LEGAL INTELLIGENCE.

The Objects and Constitution of the Herne Bay Gas Company, Limited.

Last Saturday, Mr. Frank Russell appeared before Mr. Justice Stirling, in the Chancery Division of the High Court of Justice, to support a petition presented by the above-named Company, asking the Court to confirm special resolutions which had been passed by the shareholders with the view of altering the objects of the undertaking as stated in the Memorandum and Articles of Association. He said the Company was formed in 1853, with a nominal capital of £20,000, to supply gas and other illuminating materials to Herne Bay and the surrounding districts. During the past few years, the population of the district had greatly increased, and the quantity of gas supplied was considerably in excess of what it was at the outset, or even at the date of incorporation in 1882. Under these circumstances, the Company were anxious to go to Parliament to obtain statutory powers; but the "objects," as set out in the Articles, did not specifically contain words enabling them to do this, nor were the Directors authorized to apply the funds of the Company to any such purpose. Before incorporation under the Act of 1862, the Company, by virtue of power contained in a Deed of Settlement, had leased the undertaking to certain persons at a yearly rent of £630; and out of this the dividends had been paid. The Company had now entered into arrangements to re-purchase the lease for the remaining four or five years, and to make payment in debentures or debenture stock. As there was a doubt whether the Company had power to do these things, special resolutions had been passed for the purpose; and the Court was now asked to confirm them. His Lordship said he thought the terms of the resolutions were rather too wide. He had no power to authorize the Directors to spend the funds of the Company in applying to Parliament. This was a matter which Parliament would deal with when the matter came before it. Mr. Russell argued that, under the Act, the Court had power to alter the objects in the way proposed. His Lordship said he would sanction the Company applying for and obtaining any Provisional Order or Act of Parliament for enabling them more effectually to carry any of their objects into effect, including therein any modifications of their constitution.

Eliza Farnan v. The Omagh Gas Company—Injuries Caused by a Gas Explosion.

In the Queen's Bench Division of the High Court of Justice, Ireland, last Tuesday, a motion came before Justices Johnson, Murphy, and Kenny to remit the above case for trial to the County Court Judge of Tyrone at the next Omagh Assizes. The facts of the case were stated as follows: On June 28 an explosion occurred in the plaintiff's house at Omagh, in consequence of which she was thrown down and seriously injured. Her arm was broken in two places; and she was under treatment in Omagh Infirmary for six weeks. Defendants denied liability, as the pipes had been put into the premises in 1871, at the request of the landlord, and no gas had ever been used in the house. They relied upon the contributory negligence of the plaintiff; and it was admitted that the plaintiff had no visible means of paying any costs should a verdict be found for the defendants. The Court held that, owing to the serious nature of the injuries sustained by the plaintiff, it was a fit case to be retained in the Superior Courts, and refused the motion, with costs.

New Water-Works for Otley.—The question of augmenting the existing water supply was under the consideration of the Otley District Council last Tuesday. The town's supply is now drawn from a bore-hole at Menston and other small sources, which yield a total of 240,000 gallons daily. This is sufficient for present requirements; but it is proposed to extend the supply so as to provide for the expected increase during the next twenty or thirty years. To do this, it is intended to construct a reservoir at a place called Bow Beck, on the north side of the River Wharfe, near Ilkley. It was mentioned that the cost of the scheme would be £35,000; and it would yield a supply sufficient for at least thirty years. Otley, it was pointed out, would also be able to supply other townships with water. It was decided to hold a further meeting to discuss the advisability of promoting a Bill in Parliament to empower the carrying out of these proposals.

MISCELLANEOUS NEWS.

IMPERIAL CONTINENTAL GAS ASSOCIATION.

The Half-Yearly Ordinary General Meeting of the Proprietors of this Association was held on Tuesday last at the Cannon Street Hotel, under the presidency of Mr. T. H. GOODWIN NEWTON.

The SECRETARY (Mr. R. W. Wilson) read the notice convening the meeting, and subsequently the report of the Directors, which was as follows:—

The present half-yearly ordinary general meeting of the proprietors has been convened in conformity with the Association's Acts of Parliament, for the purpose of receiving a report from the Directors upon the affairs of the Company, and of declaring a dividend for the half year ended the 30th of June last.

The following summary shows the results of the Association's operations during that period: The quantity of gas made in the half year ended the 30th of June last was 4843 million cubic feet; the quantity made in the corresponding half year of 1897 was 4631 million cubic feet—being an increase of 212 million cubic feet, or at the rate of 4·58 per cent. The total number of lights on the 30th of June last amounted to 2,760,470; and at the close of the corresponding half year the number of lights was 2,555,128, which gives an increase of 205,342, or at the rate of 8·03 per cent. The entire length of mains on the 30th of June last was 1987 miles; the length of mains on the 30th of June, 1897, was 1917 miles—an increase of 70 miles. Since the 30th of June, 1897, the number of the Association's consumers has been increased by 21,722, or at the rate of 10½ per cent.

The plant and mains at all the stations were maintained in a due state of efficiency.

The receipts for gas, and the net profit for the half year under review, exhibit a satisfactory increase.

The average cost of coal was slightly over 1d. per ton more than in the corresponding half year.

The receipts for the bye-products, coke, tar, and ammoniacal liquor show an increase, but not in proportion to the larger quantity of coal carbonized. Owing to the mildness of the winter, the price of coke had to be lowered to prevent undue accumulation of stocks; and the market for tar continues in a somewhat depressed condition. On the other hand, an improvement has taken place in the value of sulphate of ammonia; and the revenue derived from the sale or treatment of ammoniacal liquor exhibits a gratifying increase.

At Antwerp, the erection of the premises in the Place de Meir for new offices and show-rooms, the need of which was referred to in the last report, has made good progress; and the Directors anticipate that they will be ready for occupation by April next.

At Berlin, the consumption of gas continues to increase at a rapid rate; and the additions to the producing plant and storage capacity of the works which have been recently made there will shortly be fully utilized.

The Directors anticipate that it will soon be necessary to erect new works; and they availed themselves, during the past half year, of a favourable opportunity to secure a large plot of land in the Commune of Marien-dorf, which will serve as a suitable site.

The arrangements which the Directors reported had been introduced at the Gitschinerstrasse works, for the quicker unloading of the coal barges, have been put to the test during the past shipping season, and have proved eminently satisfactory.

At Brussels, the proportion of storage capacity of the gasholders to the daily consumption having reached the limits of safety, a new steel three-lift gasholder, of 140 feet diameter, in a steel tank, standing above ground on a concrete foundation, is being erected on the Forest works.

The additions to the producing plant at the Koekelberg works at this station have been completed and put in action.

At Frankfort-on-Main, such progress was made with the erection of the eight benches of inclined retorts on the Bockenheim works, that they will be ready for use this winter.

The Directors have to report having obtained concessions for fifty years from the 1st of January next for the lighting of Nieder-Schönhausen, Französisch-Buchholz, and Heinersdorf, suburban Communes to the north-east of Berlin. They have also completed the purchase and taken over the gas-works and concession for the lighting of the town of Komotau, in Bohemia. The concession gives to the Association the monopoly to supply gas and electric current until 1920.

Reference has on more than one occasion been made to negotiations pending with the authorities of the town of Haarlem, for a prolongation of the Association's concession, which expires on the 31st of December, 1902. Although very favourable offers were made, including an immediate large decrease in the price of gas, the Town Council have decided to build works of their own and to terminate the contract at the date fixed.

The Directors desire, in conclusion, to draw the attention of the proprietors to the accounts for the half year ended the 30th of June last. These have been duly audited; and from them the Directors have, in accordance with the provisions of the Companies' Clauses Consolidation Act, prepared a scheme showing the profit of the Association for the half year and the portion thereof applicable to the purposes of dividend, which they recommend now to be declared—viz., a dividend of 5 per cent. for the half year ended the 30th of June last, payable, free of income tax, on and after Tuesday, the 8th inst.

The CHAIRMAN, in moving the adoption of the report, said he desired first to refer to the absence from the meeting of two of the Directors. Mr. Bassett had for some time been unwell; and Mr. Pigou was still suffering from a cold, caught in a cold-snap at Berlin a fortnight ago. He would not on the present occasion dwell upon statistics relating to the manufacture and distribution of gas during the past half year, because what he could say would be very much a repetition of what he said at the last meeting; and he thought there were very much more interesting matters to come before their notice. He might state that Amsterdam and Vienna had not contributed their proportion to the increase of 4·58 per cent. in the total quantity of gas made; for, excluding the gas produced at Amsterdam and Vienna from the calculation, the increase in the production at the other stations amounted to 6 per cent. At Berlin, the report said that the Association had concluded contracts for fifty years with three suburban Communes. He might say that it was due to their indefatigable agent at Berlin, Mr. Delbrück, that these contracts, like so many others, had been entered into. The improvements which had been made in the carbonizing plant at the Gitschinerstrasse were a complete success. To the skill of Mr. Edward Drory (now their Chief Engineer at Berlin) as an adapter and practical worker of inclined retorts, testimony was borne by gas engineers from all quarters of the globe. He must not, however, in this connection forget

to mention how Mr. Ernest Körting had seconded Mr. Drory's efforts. In a recent visit to Berlin by Mr. Pigou, Mr. Tindall, and himself (accompanied by Mr. Corbet Woodall, their Consulting Engineer), a question of the greatest importance came before them—namely, how the site at Mariendorf, referred to in the report, could be most economically utilized for a large gas-works, meter factory, and subsidiary works. The site consisted of about 200 acres, 6 miles south of the centre of Berlin. The need for this new site was apparent from the impossibility of extending their present works, which were situated in populous districts, while the growth of their consumption in Berlin was at the rate of 10 per cent. per annum. By Midsummer, 1900, there would have been spent on the purchase of this site, on its connection with the railway, which bounded it for half a mile between the stations of Mariendorf and Marienfelde, on the partial erection of carbonizing and storage plant, on mains, and on the meter factory, a sum of at least £250,000. He might say that these works, besides their railway connection, would have a projected canal passing through them. With regard to Haarlem, the Town Council, as reported, had decided to build their own works, and put an end to the Association's concession on Dec. 31, 1902. Every effort had been made by the Directors for years past to secure a prolongation of this contract. Very advantageous terms had been offered to the Municipality, who, inspired, no doubt, by the action of the Town Council of Amsterdam, anticipated more favourable results than the Association had ever been able to obtain there. Thus the Directors' efforts had been without avail. The report mentioned the acquisition of the concession of Komotau. Since the close of the half year, four other concessions in Hungary and Bohemia had been obtained. These towns had a total population of 80,000; and the works and concessions would cost something less than £100,000. The labours of the Directors in finding proper re-investments for the shareholders' capital when concessions expired were more difficult year by year; and therefore, of course, the terms on which acceptable re-investments could be made became less and less remunerative. This arose in a great measure from the better credit now enjoyed by the larger towns. Amsterdam could now borrow at the same rate of interest as the British Government could 25 years ago; and thus there was a tempting margin between a low rate of manufacturing profit and the rate of interest paid for the capital which produced it. It was by no means certain that these conditions would remain permanent, and Municipalities might well have to reconsider their position. Before making any statement as to the position of the Association as affected by the falling in of two important contracts, he would remind the proprietors; in order that they might have them steadily in view, what were the principles which had guided the Association during the period of prosperity of some seventy years which followed an early period of great adversity. These principles were briefly: "Look before you leap" and "Don't prophesy—at any rate long—before you know." Recent events at Amsterdam and Vienna illustrated these principles from contrasted points of view; for the loss of Amsterdam, he was glad to say, would not appreciably affect the receipts of the Association, while at Vienna a large income was involved. These principles of action were embodied in the operation of three funds—the contingency fund, the reserve fund, and the depreciation fund. The last-mentioned fund was a sinking fund to recoup definite losses of capital at definite periods in the future, which were capable of actuarial calculation. Its accretions were entirely under the control of the Board of Directors. The reserve fund now consisted of £400,000 Consols, locked up by the proprietors many years ago out of the immediate control of the Directors. With the discretion of the proprietors, he did not wish to interfere; but he could wish that the investments of this fund were in securities now equally liquid, but bearing a higher rate of interest. The contingency fund was what he might call the great "buffer" fund, which met the shock of losses both of capital and income which were outside the limits of actuarial calculation. Its accretions were entirely within the control of the Board of Directors. With respect to expiring concessions and the return of capital, he would first take Amsterdam. The arrangements for the transfer of the works and mains to the town, under the terms of the Association's contract, were in every way satisfactorily completed on Aug. 10 last, when the Municipality took possession after paying the Association the whole of the amount which had been agreed upon—namely, a net sum of £1,330,000. To this had to be added the amount standing to the credit of Amsterdam in the depreciation fund—namely, £340,000—making together £1,670,000. From this must be deducted the total amount invested by the Association in the business at Amsterdam during the fifteen years of their contract there, which was £1,280,000, leaving a capital-profit of £390,000. He informed them at their last meeting that the Directors would take into consideration how these moneys should be dealt with; and he now wished to give them particulars of the manner in which it had been determined they should be treated. He was sure that they would fully approve of the proposals. It was needless to say that they had received much advice upon the subject. It had been suggested, for instance, that they should divide a large sum among the proprietors; that even a return of capital should be made. But after examining the question with most minute care, the Directors had come to the conclusion that neither of these proposals could be recommended to the proprietors, bearing in mind the prospects of the Association, and the desirability of maintaining a steady dividend of 10 per cent. upon the nominal capital. Firstly, then, they had decided to pay off the 4 per cent. bonds, amounting to £376,400. Those which matured in August last, amounting to £142,200, had already been paid; and the money for those maturing on Aug. 1, 1899, amounting to £234,200, had been set aside and invested for the purpose. Secondly, in view of the decreased profits which they might earn for some time after 1899, they proposed to set the capital-profit of about £390,000 to form a "dividend equalization fund," for the purpose of maintaining the dividend at a normal rate of 10 per cent. With regard to the balance, they had decided to keep this for capital purposes. It was capital, and as such should be used; and the Directors thought they would be able to use it to the proprietors' advantage. They had not forgotten their duty towards the officers and workmen who had faithfully served them at Amsterdam; and they had received from them their appreciation of what had been done for them. With regard to Vienna, the events which had taken place during the current half year were briefly these: Two years ago, he told them that he had confidence that they would receive justice from the Courts at Vienna as to the suburban contracts. After the decision of two Courts had been in the Association's favour, the Corporation came to them in September last to ask whether they would be inclined to sell them the whole of the gas-meters fixed in the inner city, and on what terms. The Board replied that they would be prepared to entertain the proposals, provided that a definite and clear understanding was arrived at in regard to matters appertaining to the suburbs, and others questions. The contracts made with the suburbs, as the proprietors knew, expired at varying dates—one as late as 1920. A way was thus paved for negotiations, which were conducted by Mr. Lindon and Dr. Teltscher; and the result was that an agreement had been arrived at, which, while it removed a considerable difficulty from the path of the Corporation, might be considered satisfactory for the Association. The chief points of this agreement were that the law suits pending between the City and the Association were withdrawn; that the Association obtained a unified contract for the suburbs (with one exception) until Dec. 31, 1911, at the expiration of which the Corporation must take over, at a valuation conducted on specified lines, all the mains, meters, lanterns, &c., belonging to the Association in these districts (the gas-works supplying these districts, for special reasons, not to be included in the valuation); and that the Association sold to the Corporation the whole of their meters in the inner town. It was gratifying to know that the Association would remain in undisturbed possession of their property, and would continue to supply a large and progressive portion of Vienna for another thirteen years. He thought they might congratulate themselves upon their policy of the past two troublous years; and he might be pardoned for expressing the hope that their future relations with the Town Authorities of Vienna would be peaceful, and of a much more friendly nature than they had been in the past. The districts which they retained would be supplied from three of their seven existing works; and the arrangements would not necessitate any considerable outlay. He was quite sure that all the Proprietors would join with the Board in specially thanking Mr. Lindon and Dr. Teltscher for their successful conduct of these negotiations. He would now say a few words as to the general position of the Association in view of the present outlook. Thanks to the dispositions which the Directors had made and proposed to make—such as the establishment of a dividend equalization fund—they might look forward to a continuance of a 10 per cent. dividend, notwithstanding the loss of income at Vienna. And the strength of their financial position at the present moment was certainly most extraordinary, contrasted with what it was (say) only twelve years ago, or, indeed, which it had ever attained in the past history of the Association.

Mr. J. Horsley Palmer, in seconding the motion, said he desired to endorse what the Chairman had stated regarding the services of Mr. Lindon and Dr. Teltscher. He did not think the proprietors had any idea what it was to attempt negotiations with a foreign Municipality, such as they had to deal with at Vienna; but they had had some slight idea conveyed to them by what they had seen in certain of the newspapers. There was, however, no doubt that these two gentlemen had had to bear the brunt of all sorts of abuse; and every conceivable kind of difficulty had been thrown in their way for he did not know how many years, during which the negotiations had been going on. He was very thankful, for their sakes, that the outcome had been as satisfactory as it had.

The Chairman, in reply to questions, stated that what the Municipality of Vienna now took from the Association was confined to the meters in the old town. Out of their seven works, three would be utilized for the supply of the suburbs. Three stood in the town, and one was on the left bank of the Danube at Floridsdorf, which was quite independent of Vienna. With reference to the question about the bonus, he thought the proprietors would agree with him, if they would consider what the Association were preparing to pass through, that it was quite enough for him to prophesy now that the dividend of 10 per cent. would be maintained.

The motion was then put and carried unanimously.

The Chairman next proposed the declaration of a dividend of 5 per cent. for the half year ended June 30 last, free of income-tax, upon the £3,800,000 stock of the Association.

Mr. J. Horsley Palmer seconded the motion, which was agreed to.

The Chairman afterwards proposed a vote of thanks to the staff at home and abroad; remarking that the Directors could not carry on the affairs of the Association satisfactorily without being supported by a faithful, energetic, and trustworthy staff. He had already referred specially to two members of it abroad; and he might state that the services of the staff at home should be equally recognized with those of their colleagues abroad. He had been upwards of thirty years a Director of the Association, and he did not know that they had been better served at any time during that period than they were now.

Mr. A. Lucas, in seconding the motion, stated that he had been brought much into contact with members of the staff, both at home and abroad. The position of gas engineers was nowadays by no means a sinecure, as they had to fight with the electric light and to deal with all the latest improvements in gas, which followed fast and furiously upon each other. He was sure their Engineers abroad did this; a proof being that in many instances they had succeeded in ousting the electric light from many places in favour of incandescent gas-burners. It was owing in part to these burners that the very large increase in the consumption of gas of which they had heard that day was due.

The resolution was unanimously carried.

Mr. Horncastle afterwards proposed, and Mr. John Drew seconded, a cordial vote of thanks to the Chairman and Directors.

Mr. R. Fox supported the proposition; adding that he thought the proprietors should express in a more substantial manner their appreciation of what the Directors had done for them. For his own part, he considered that the Board ought to receive some honorarium; and he should also like to see the services of Mr. Lindon and Dr. Teltscher recognized in a similar manner. The proprietors had been brought out of an extremely difficult position, and they were now in a far better one than they could have expected to be at one time.

The motion was carried unanimously.

The Chairman, in acknowledging the vote, said he desired expressly to refer to what he supposed might be called the rider to the resolution which had been brought forward by Mr. Fox. Anything in the direction advocated by that gentleman, so far as Mr. Lindon and Dr. Teltscher were concerned, was a matter for the Board, who would not forget it. The proprietors' appreciation of what the Directors had done for them was one of the things which carried the Board through many difficulties. He might add that the support the Directors had received from the

proprietors in not pressing for information when it could not be given consistently with the welfare of the Association had borne good fruit in the past, and would, he was sure, do so in the future.

Mr. POTTS proposed, and Mr. YELD seconded, a motion that a Committee be appointed for the purpose of considering the grant of an honorarium to the Directors.

The motion was put and carried *nem. con.*

The proceedings then terminated.

COLONIAL GAS ASSOCIATION, LIMITED.

The Annual Meeting of this Association was held last Tuesday, at the London Offices, Suffolk House, Laurence Pountney Hill, E.C.—Mr. SAMUEL SPENCER in the chair.

The SECRETARY (Mr. A. J. Kingdon) read the notice convening the meeting; and the report and accounts, of which an epitome appeared in the "JOURNAL" for the 25th ult., were then submitted.

The CHAIRMAN, in addressing the shareholders, said he had little to say beyond what was stated in the report and accounts. The Directors had again to regret that the Colony had not made so much progress during the past year as they had every right to expect. At the same time, so far as the Association were concerned, there was a slight improvement; and it led them to be very hopeful for the coming year. Everything pointed to a better state of affairs. The banks and railways indicated that, from an industrial point of view, things were certainly beginning to give more satisfactory results; and the Manager of the Association (Mr. George Swinburne) reported that the wheat harvest and wool-clipping prospects were most promising. He also stated that property in Victoria was selling at higher values than it had done for the past six years; and this in itself must be taken as a sure sign that trade was decidedly increasing. As regarded their own operations, the extra dividend the Directors had anticipated being able to pay this year was smaller than they had hoped to recommend. Still he would like the shareholders to accept it as an earnest of something better to be expected during the current year. Turning to the balance-sheet, he was pleased to say the number of their consumers had increased by more than a hundred; and the Manager was endeavouring to improve upon this during the coming year. With respect to the Geraldton Gas-Works, since the last meeting it had been decided to convert the concern into a local Limited Company, in which the Association had arranged to take a fairly large interest; and the Directors had also entered into an agreement for the balance of £2590 of the money advanced for the erection of the works, to be returned. The Manager reported that all the works were in good condition; and he was most sanguine as to the future of the Association—in fact, he summed up his views in this remark: "We have had seven lean years; and I trust that the coming year will be the commencement of seven prosperous ones." The Chairman concluded by moving the adoption of the report and accounts.

Mr. W. C. PARKINSON seconded the motion.

Mr. M. CURRY inquired the object of turning the Geraldton works into a Limited Company, and what benefit the Association secured by the conversion. He had understood that the business was going to be a good one; and he could not see why the Association had not kept it. Anyway, he should like to know if they had made a profit on the transaction, or only obtained exactly what had been spent on the works. There was another item on which he should like a little information. The accounts stated that they had an invested reserve fund of £533 in the Charters Towers Gas Company. By this it seemed that the Association had increased their holding in that Company. He could scarcely call that a reserve; and he should have thought it would have been better to have had the cash in hand, or to have put it in a good security paying 3½ or 4 per cent. He also noticed that they had about £30,000 more capital than in 1891, and two more works, and yet they were not earning so much profit now as they did then.

The CHAIRMAN, in replying, said that, with reference to the transfer of the Geraldton Gas-Works to a Limited Company, the Association only held a two-thirds share in them to begin with; and the idea was that, making a local Company of them would improve their profit-earning capabilities. The terms set forth in the accounts were the only ones the Directors could get. The amount expended on the works by the Association was £4697; and the Company were paying them 3666 shares of £1 each, which, taken at cost, represented £1907. The balance of the purchase money, which was payable in cash, was £2790; and of this they had had £200, leaving a balance of £2590.

Mr. PARKINSON, referring to the remarks as to the invested reserve fund of £533 in the Charters Towers Company, said they did not purchase the shares representing that sum. They were simply an allotment to the Association, as shareholders in the Charters Towers Company, by way of a bonus. The shares stood at a premium, and were paying 10 per cent.; so that there would be no difficulty about selling them.

The CHAIRMAN added that at the previous meeting it was decided that the bonus shares from the Charters Towers Company should be treated as a reserve fund; and it would be seen that they had now added the 10 per cent. dividend received on them—making the total £586. The Directors were anxious to accumulate a reserve fund, so as to make the dividend more stable. Regarding the remarks made by Mr. Curry as to the increase of the capital without a corresponding increase in the profits, the Directors felt the position very much. Although the money spent had not, through the condition of affairs in the Colony, produced what was expected of it, their prospects were better now than they had been in the past seven years.

Mr. T. K. GRIFFIN observed that, having some knowledge of the Australian trade, he thought the present position of things indicated that they had now reached the end of bad times in the Colony. For his own part, he considered the shareholders might, under the circumstances, congratulate themselves on being able to get a dividend. There was a small increase on this occasion; and he hoped with the Chairman that it was the harbinger of better things.

The motion was then adopted.

On the proposition of the CHAIRMAN, seconded by Mr. A. GODWIN-HAMMACK, a dividend was declared for the past half year at the rate of 3½ per cent. per annum, free of income-tax.

Two of the Australian Directors (Mr. Henry Andrews, jun., and the Hon. Thomas Bent) retired by rotation; and on the proposition of the CHAIRMAN, seconded by Mr. G. GREGORY FISHER, they were unanimously re-elected.

Messrs. Alfred Lass, Wood, and Co., having been re-appointed Auditors,

A vote of thanks was passed to the Australian Committee and Mr. Swinburne, on the motion of the CHAIRMAN, seconded by Mr. CURRY. A similar compliment was also paid to the Chairman and Directors.

GEORGETOWN (BRITISH GUIANA) GAS COMPANY, LIMITED.

The Ordinary Half-Yearly General Meeting of the Company was held on Tuesday last, at the Offices, No. 30, Gracechurch Street, E.C.—Mr. CHARLES GANDON in the chair.

The SECRETARY (Mr. S. Wood) read the notice convening the meeting; and the report of the Directors was taken as read.

The CHAIRMAN, in moving the adoption of the report and accounts, said he thought the balance-sheet for the half year ended June 30 last showed somewhat better results than those for the preceding two or three half years. The accounts would have been even more favourable but for the fact that there was a falling off both in the revenue from private consumers and in the receipts from residual products. Compared with the preceding half year, there was a decrease of £55 in the former item; but in spite of this the amount received was £28 more than in the six months to June of last year. The falling off in the receipts from residual products amounted to £94, as against the preceding half year. On the other side of the accounts, coals had cost £11 more than in the previous six months, but £45 less than in the half year to June, 1897. The principal reductions effected were in repair and maintenance, which cost £83 less, and in salaries, which were £174 less. The saving in the latter item was due simply to the fact that the salary paid to the late Engineer and Manager ceased at the end of last year. The profit for the half year amounted to £206, which was £100 more than in the preceding half year, and £136 more than in the six months to June last year. Although, as he had said, the present accounts showed some improvement over recent ones, the results were still far from satisfactory. He was, however, glad to say that, while for the previous half year no dividend was declared on either class of shares, the Directors were now in a position to recommend the payment of a dividend on the preference shares of the Company. In September last a destructive hurricane visited the West Indies, which caused great damage in many places; but fortunately it did not appear to have reached Georgetown. While, however, they might congratulate themselves on having escaped the effects of this disastrous storm, they still had to face the unfortunate fact that the business of the Colony remained in a very depressed state. Until some improvement took place in this respect, he was afraid that no very great success could attend the efforts of the Company.

Mr. ALFRED LASS seconded the motion, which was carried unanimously.

On the motion of the CHAIRMAN, seconded by Mr. R. BERRIDGE, a dividend was declared on the preference shares at the rate of 3 per cent. per annum, for the half year to June 30 last.

The CHAIRMAN next proposed, and Mr. H. W. ANDREWS seconded, a vote of thanks to the officers and staff of the Company in Georgetown and London.

The SECRETARY having briefly returned thanks,

The proceedings terminated with a similar vote to the Chairman and Directors.

SOUTHAMPTON GAS COMPANY.

The Ordinary Half-Yearly Meeting of this Company was held last Thursday—Mr. R. C. HANKINSON in the chair.

The SECRETARY (Mr. C. Crowther Smith) having read the notice convening the meeting, the report of the Directors was presented.

The CHAIRMAN moved the adoption of the report. He referred to the fact that this was the Jubilee year of the Company, which was incorporated in 1848. Since that time the population had trebled; for in 1851 it was only 35,000. He mentioned this for the reason that the Company claimed to have kept pace with the increased requirements of the town consequent on its expansion. Their Jubilee year, too, was commemorated by the passing of the Bill which the Company had promoted, and which received the Royal Assent on the 2nd of August last. During the half year ending the 30th of June there was an increased sale of nearly 5 million cubic feet of gas as compared with the corresponding period of 1897. This was really the most satisfactory feature of the concern; for so long as they could augment the sale in this or a larger proportion, they would have every reason to be satisfied. There had been a substantial rise in the amount received for residuals, the value of which had been low of late years. The sum available for division was £7369; and to make this up to the amount required to pay the maximum dividends, the Directors proposed to draw £944 from the reserve fund. As to the Company's new Act, there had been, it appeared, some misapprehension. The passing of the Bill through Parliament was a very anxious time for them. They did not get it through without some opposition, which did not come from the borough but from Eastleigh; and, of course, it increased the cost of getting the Bill. The powers conferred upon the Directors for the conversion of the existing share capital and debenture stock were intended to be exercised so that the new 5 per cent. stock should be substituted for the share capital, and new 4 per cent. debenture stock for the existing debenture stock. Each 10 per cent. share would receive £100 of 5 per cent. stock, each 7 per cent. share £35, and each 5 per cent. share £20; while each £100 of 5 per cent. debenture stock would receive £125 of 4 per cent. stock. The shareholders, therefore, would not suffer at all in income by the conversion—in fact, the Directors believed the various issues would become more valuable than they were before. One thing they expected to have to submit to was that they had to raise their illuminating standard from 14 to 15 candles. This was desirable, no doubt, for consumers, but it was costly to the Company. He hoped it would prove satisfactory to the public. It might be asked why the Company wanted so much money as they were empowered to raise by the Act. The Directors had expended all their capital in extending the works, and they now contemplated adopting

prepayment meters. This would benefit the poorer members of the community who now burnt oil; and the Directors believed it would be advantageous to the Company.

Mr. J. K. SAMPSON, in seconding the motion, bore testimony to the great efforts put forth by the Directors, Secretary, and officials in connection with the new Act.

The motion was carried unanimously; and the maximum dividends were declared.

On the motion of Mr. AMES, seconded by Mr. PARSONS, the fees of the Directors were increased by £200 per annum.

The CHAIRMAN having expressed his own and his colleagues' appreciation of the kind feeling which had prompted the vote,

The business of the ordinary meeting closed.

At a Special Meeting subsequently, the Directors were authorized to issue £50,000 of 5 per cent. stock as required, £10,000 of which is to be at once offered for tender.

The thanks of the shareholders having been given to the Directors, Secretary, and staff,

The SECRETARY, in replying for his department, said the Act of Parliament just obtained might be regarded as one of the greatest successes that could have been achieved in the face of the very heavy opposition with which the Company were threatened. As regarded the rating appeal, he felt bound, in justice to the Company, to say that no less than four offers of arbitration were made by the Directors; and if these had been acceded to, litigation which had cost the town £3000 would have been avoided. The Company had saved £600 or £700 a year by the appeal; but it would take the town fifteen years to recover the disastrous expenditure incurred by the Board of Guardians in an unnecessary way.

The meeting then terminated.

OIL GAS ENRICHMENT COMPANY, LIMITED.

The Fifth Annual General Meeting of this Company was held in Dowell's Rooms, Edinburgh, on Thursday, the 27th ult.—Mr. J. MILNE (of Messrs. J. Milne and Son, Limited) in the chair.

The CHAIRMAN said the year had, on the whole, been a very quiet one with them. There was rather an improvement, as the proprietors would see, in their income; and they were, he was glad to say, able to pay off the final amount of their preliminary expenses. Some of them would, no doubt, be anxious to know something of the position of the plant at Paisley. It was still continuing in a very satisfactory state; but since their last meeting they had found it necessary to make some further additions to it, and to carry out certain developments which had shown themselves to be necessary in a new plant like this. They had it running for a long time in the early part of the year, and in another few weeks it would be in use permanently. The further lowering of the price of cannel coal, and the high price of gas oil, had, in one or two cases of very small gas-works, induced them to give up the use of their process. But in other places the process had increased in size; and the result was, as they saw from the balance-sheet, that they had more royalties this year than last. There was a slight shrinkage in the present value of their investments. They were still a good deal higher than they were when made; but fluctuations of this sort could not be helped. They were perfectly satisfied that the investments were good; and they had little fear, if they ever came to be realized, as to their fetching more than was paid for them. He concluded by moving the adoption of the report (*ante*, p. 926) and the payment of a dividend as recommended.

Mr. G. HARRISON seconded the motion, and it was carried.

Mr. Milne and Mr. Hugh Brown (Glasgow) were re-elected Directors; and a sum of 50 guineas was voted to the Board as remuneration for their services.

Water Divining.—The operation of indicating the presence of water by divination has lately been successfully carried out on the Grey Towers Estate of Mr. Dorman, at Guisborough; on the property of Mr. A. Brooke, at Killybegs, co. Donegal; and at the residence of Miss Hollans, Dene Park, near Tunbridge Wells.

Additional Water Supply for Sutton-in-Ashfield.—Last Tuesday, Mr. F. H. Tulloch held an inquiry at Sutton-in-Ashfield respecting an application by the District Council for sanction to borrow £8000 for new water-works. The Engineers for the scheme are Messrs. Hodson; and they gave evidence showing the necessity for an additional supply.

Collapse of a Water Scheme for the Whaley Bridge District.—The Whaley Bridge District Council have been promoting a water scheme for their own and surrounding authorities' districts, the estimated cost of which was £26 000. Early in the negotiations, New Mills withdrew from participation in the project; thereby reducing it by about one-half. As already reported in these columns, the New Mills District Council have decided to apply for parliamentary power to carry out a scheme of their own; and now the other authorities have come to the conclusion that they can procure supplies cheaper than by uniting with Whaley Bridge. In consequence of this, the Whaley Bridge District Council have decided to take no further action, and have directed that the costs incurred up to the present time be ascertained, and an account rendered to each authority concerned.

The Proposed Purchase of the Larne Gas-Works.—Last Friday week, a meeting of ratepayers was held at Larne for the purpose of considering the proposal of the Commissioners to purchase the gas-works for a sum of £4350. All the speakers on the ratepayers' side were of opinion that the price was far too high for the existing plant, as it had been running for upward of fifty years; and, in consequence, it was contended that the distributing-mains were almost unfit for use. It was also stated that numerous other defective matters would have to receive attention. Further, the lease of the present premises, it was mentioned, would expire in the course of thirteen years; and it would necessitate a large expenditure to renew it, and provide more accommodation. On behalf of the promoters, illustrations were given as to what had been done in other towns, to show the benefits that were likely to be secured by the purchase. Finally a resolution was passed asking the Commissioners to proceed no further in the matter, seeing that a new Town Council will be constituted under the Local Government Bill at the beginning of next year.

THE NEW GAS-WORKS FOR GLASGOW.

Site Agreed Upon by the Corporation.

A Special Meeting of the Glasgow Corporation was held on Monday last week, to consider the recommendation of the Gas Committee to acquire a site for new gas-works at Blochairn and Blackhill. Lord Provost RICHMOND presided. The Committee submitted the following report by Mr. David Rankine, Civil and Mining Engineer, of Glasgow:—

Since the beginning of last year, I have, both along with Mr. Foulis and individually, been making inquiry and investigation with the object of finding a site suitable for the erection of new gas-works of such magnitude as would meet the further requirements of the city.

The more prominent points which were kept in view were (1) the situation, extent, and elevation of the site; (2) facilities for public railway connection; and (3) stability of the lands, in respect of the likelihood of their being affected by past or by future mining operations.

Along with Mr. Foulis, I discussed and considered generally the vacant lands around the city; and afterwards I personally examined and inquired into those places which seemed most desirable, these being taken up much in the order of their apparent suitability.

The inquiry was, in the first instance, conducted as privately as possible; but latterly the object had to be made known to agents and owners of lands, so that facilities might be had for particular inquiry. It thus became known that the Corporation Gas Department was requiring a large area of land; and various parties came forward offering ground. In these cases also the places suggested were carefully examined.

There were nine sites specially investigated, and their situation extended from the north-east, round by the east and south-western sides of the city, and embraced lands several miles distant from the city boundary. The question of the suitability of the major number of the sites turned mainly on the stability of the ground in respect of past or probable future mining operations; and written reports were made regarding several of the subjects.

In respect of one of these subjects, which was specially investigated at an early stage of the proceedings, and which seemed to be in many respects the most eligible, the assistance of other two experienced mining engineers was obtained, and they also made special inquiry, and joined in a report with me on the subject. I did not confine my investigations simply to an ascertainment of the extent of past mining, or to speculative opinions regarding the stability of the lands; but, under my direction, and as instructed by Mr. Foulis, the lands were "bored" at considerable cost, so as definitely to ascertain the condition of the old workings, and to find whether these had consolidated to an extent which would render the lands safe for carrying the structures proposed to be put upon them.

The investigations thus made led to the condemnation of lands which, in respect of situation, elevation, and other conditions, were eminently suitable as a site for the proposed works. The risk of subsidence of the surface, with consequent damage to structures that might be put thereon, was so probable, that none of the engineers who examined the lands advised the risk being undertaken.

What was thus ascertained led both Mr. Foulis and me to be doubtful of other sites under which workings of a similar kind were known to have been made. The cost of railway carriage from coalfields on the eastern side of the city, from which coal supplies are mainly obtained, to sites on the south-west of the city, was the principal reason which operated to the exclusion of these.

One site near Blochairn, on the north-eastern side of the city, is free from mining objections, although mining operations have been conducted in other lands immediately to the westward, and also in lands a short distance to the eastward of it. The ground is undulating, but the undulations are favourable for the construction of works which have different levels for different parts; and the amount of excavation necessary to be made at one place is required for levelling up at another. Economy of construction is thus gained, in addition to facilities for handling the raw materials and the products into which these materials are converted. There is no difficulty in having satisfactory connections with both the Caledonian and North British Railways, although possibly it may be necessary to obtain parliamentary power for the construction of one or both connections.

After full and lengthened inquiry, and taking into account all the requisite conditions, I am of opinion that the site near Blochairn, on the northern side of the Monkland Canal, is, of all the sites that have come under my notice, the most suitable one for the proposed new gas works.

The TOWN CLERK (Sir J. Marwick) said he had a communication from the Secretary of the Dennistoun Municipal Ward Committee, enclosing a resolution by the Committee, passed at a meeting on the previous Friday, "protesting against the proposal to build a gas-works in the vicinity of Alexandra Park," and asking the Council to receive a deputation on the subject. He had also a communication from the Rev. R. W. Dobbie, Free Church, Blochairn, asking to be heard very strongly in favour of the proposal. It was resolved to hear the deputations.

Mr. W. B. BUYLARS, on behalf of the Dennistoun Ward Committee, said he could hardly exaggerate, by anything he could say, the antagonistic feeling to the proposal which existed in the district. The gas-works, they learned, were to be among the largest in the kingdom; and it appeared to them to be altogether contrary to the general object of the Corporation in securing and equipping parks in the various parts of the city, that they should deliberately plant, in the immediate vicinity of a park already heavily handicapped, so large a works of this kind. It was denied that the effluvia of a gas-works were noxious; but the Committee were convinced that those who made such statements could not themselves have lived in the immediate vicinity of a large gas-works, or have attempted the culture of flowers or other vegetation in such environs. They had asked several citizens residing in the neighbourhood of the present gas-works; and their opinion seemed conclusive as to the effect on vegetation. There was the argument, they understood, that the works would draw labour to the district. The same might be said of any works; but he did not think it was a strong point, even in such a case. They had, in their deputation, large property owners in the district, who felt that a detrimental effect would be exercised by such a works upon their interests. The arguments against the erection of the works seemed to them so strong, that they had no hesitation in placing them before the Council, in the full belief that, on considering them, the Council would at least cause delay in the carrying out of the proposals of the Gas Committee. They did not urge all this in regard to Dennistoun in preference to other parts of the city. They considered that land outside the city might be obtained sufficiently cheap to counterbalance any extra expenditure involved.

The Lord Provost said he was pleased to hear them say that gas-works must be put down somewhere; and he was sure it was the intention of the Town Council, whatever they might do, not to erect them where they would hurt any body of the citizens. They required the works; and they had been advised that this was the place for them. What the deputation had said would receive the consideration of the Council.

The Rev. R. W. Dobbie said that he and his office bearers believed that it was the desire of all the people in the neighbourhood that the gas-works should be erected at Blochairn. The locality had not shared hitherto in the general prosperity of the city of Glasgow. For many years feuing and building had been unknown. They saw, in the prospect of the erection of gas-works, great possibilities for the whole neighbourhood. They thought that an era of activity and prosperity would speedily follow in that part of the city. Objections had been raised, not, so far as they knew, in the locality itself, but outside it. Indeed, everywhere in the district directly involved there seemed to be unanimity in favour of the proposal. It had been said that Dennistoun would suffer from the fumes; but those who had to do with the erection of gas-works said this was a remote possibility. They were told that the beauty of Alexandra Park would be utterly destroyed. Even if this were true, beauty should always give way to the triumphs of industry and labour. Some of the loveliest flower displays he had been privileged to look upon had been in the neighbourhood of the existing gas-works. Blochairn had been called "a dark place," and so it was. Erect gas-works there, and they should be glad to give light to the whole city of Glasgow.

The Lord Provost thanked Mr. Dobbie for his remarks.

Mr. R. M. Mitchell, the Convener of the Gas Committee, moved the recommendation of the Committee, as follows: "(1) That the report of Mr. Foulis be approved; (2) that in their opinion the ground referred to in the report is the most suitable site for the proposed gas-works; (3) that application be made to Parliament in the ensuing session for power to acquire the ground compulsorily, or by agreement, for the erection thereon of the proposed gas-works, and to construct the necessary roads, railway sidings, and other subsidiary works; and (4) that parliamentary authority be also applied for to purchase compulsorily, or by agreement, additional ground near Dawsholm, extending to about five acres, for an extension of the Corporation residual products works there, with the requisite railway connections." He referred, first, to Mr. Foulis's report, which could not fail to be eminently satisfactory to the Town Council. It spoke of the continued success of their gas undertaking over a long period of years, during which they had not failed to give a satisfactory supply of gas at the lowest possible price to their ever increasing consumers. They had at present three gas-works. Two of these, Dawsholm and Tradeston, were modern works, equipped with the most approved labour-saving apparatus, and had been the admiration of many visitors from other municipalities. The Dalmarnock works were antiquated, and unsuitable for the introduction of modern appliances, and were situated in what was now a crowded locality, and intersected by streets. They had been of late years worked on this account at an annual loss, compared with the results of the other works, of £9000 to £12,000. If the proposed scheme went through, it was intended to convert the Dalmarnock works into a gasholder station, and thus prevent the production of gas at so unfavourable a cost. It said much for those who controlled the Gas Department in former years that they had the foresight to extend the works, with the result that a demand for gas which had more than doubled itself within the last ten years had been successfully met. This increase of demand was still progressing, and at present had risen by 7 per cent. during the current financial year. No wonder then that their Engineer had urgently recommended the acquiring of a large area of ground on which to erect works to meet the future growth of the city. Their retorts would be fully in use by the winter of 1900. Their ground was all occupied; and it was imperative that they must, as in former years, prepare for future growth of demand. As long as five years ago the late Bailie Ure and the two Sub-Conveners considered it necessary to look out for a suitable site for new works. Many localities were visited; but, unfortunately, nothing suitable was found up to the time of Bailie Ure's death. Since then, as Convener of the Committee, he, along with Mr. Foulis, had continued these inquiries—quietly of necessity, but none the less thoroughly. As Mr. Rankine reported, there were three essential requisites for suitable ground for a large gas-works—extent and elevation of site, facilities for suitable railway connection and favourable rates from the collieries from which supplies were drawn, and stability in respect of the land not being affected by past or future mining operations. Having this in view, they took the advantage of Mr. Rankine's experience, especially as a Mining Engineer knowing well the general workings of coal in the Clyde Valley. Besides his valuable plans, they also had the advantage of the experience of two other Engineers. They visited and investigated a number of sites; and in the end were forced to the conclusion that the ground recommended both by Mr. Foulis and Mr. Rankine, as regards stability, extent, and railway communication, was in every way the most suitable that they had discovered for the erection of the proposed works. The higher part of the ground could be easily connected with both their principal railways, and was most suitable for receiving coal and conveying it to the retorts. At the lower end they had both railway and canal, by which they could distribute the bye-products—a large part of their manufacture. Indeed, such a combination of railway and canal facilities could not be easily found in any other locality near Glasgow. Besides this, they would be enabled to utilize a considerable portion of their own Blackhill land, which had hitherto been a most unprofitable asset of their Common Good. In fact, they were willing to schedule the whole of it, and thus possibly relieve the Finance Committee of an undesirable possession. The cost of all this was estimated at £1,000,000; but this amount would be spent over a considerable number of years, and the various sections of the work would only be proceeded with as the growth of the city demanded. It had been raised as an objection that the matter had been sprung too suddenly upon the Council; but new gas-works were referred to as long ago as 1894, in Sir James Bell's yearly summary of Corporation work. It had also been mentioned for years past, in moving the Gas Committee's annual report; and it was only on account of unavoidable delay in important negotiations, that this special ground was not sooner brought before the Committee. The price mentioned by the proprietors was thought by some to be in excess of its value; but they proposed nothing further in regard to price than that parliamentary authority be applied for to acquire the ground compulsorily, in which case the sum would be fixed under the Lands Clauses Act, or by agreement, which was surely fair to both parties. A deputation had waited upon them that day objecting to a gas-works being planted so near the Alexandra Park. He was sure they would all respect as far as possible the amenity of every part of the city. But their other gas-works were situated in much more objectionable proximity to residential districts than these works would ever be; and when Mr. Whitton advised them that he could offer no serious objection to the proposed site, he thought that the Council would feel it to be their duty to confirm the decision of the Gas Committee, who were seeking to do their best for the citizens. They were under a penalty to give an efficient gas supply to their consumers. Their Engineer was no stranger to them. His past record entitled him to their confidence; and they would be incurring a grave responsibility were they to disregard his urgent recommendation. Whatever other doubtful schemes might be proposed, this at least was a proper and legitimate municipal undertaking. They had not in the past had to face anything but prosperity and success. This outlay would not impose additional burdens on the citizens; and he was sure that they would not look in vain for their loyal support, which would enable them for many years to come to continue the past traditions of the Gas Committee. He had already referred to the foresight of their predecessors; and he believed that the prudent step which they now proposed to take would be viewed with equal approbation both by their successors in office and by the inhabitants of their great and growing city.

Bailie Fife seconded the motion. He said that the scheme which was put before them would not lead to anything like taxation upon the citizens. It was for the extension of a very large commercial business—a business which had been going on from year to year in a very successful manner. If they referred to the annual reports of the Gas Committee for some time past, they would see that the extension of the Gas Department had been going on steadily. Last year the increase was 3½ per cent.; while for this year, since June 1, the increase had been about 7 per cent. This showed that, even in the face of the extended use of electricity, there was still a large and increasing field for gas. He thought they were exceedingly fortunate in the fact that Mr. Foulis and the Committee had resolved to go forward and build these new works. The Convener had very clearly stated that this was no new scheme which was put forward. Those of them who had been associated with the late Bailie Ure, and who read his financial statements from year to year, must have noticed that he pointed out that the quantity of coal carbonized at Dalmarnock was 180,000 tons a year, and that it was carbonized at a cost of 1s. per ton more than they could produce gas at in either the Dawsholm or the Tradeston works. If they took the difference at £9000, they had there sufficient money, in the saving from that one item alone, at 3 per cent., to pay the annual charge on a capital outlay of £300,000, for the first instalment of the new works. In addition they had, in connection with the Bridgeton works, a very valuable asset in the shape of about 80,000 square yards of ground. All this might not be required for the storage of gas; and there must be a considerable piece of ground which could be judiciously placed on the market, and the price received for which would go largely to recoup the expense incurred in the purchase of the new ground. He believed that in going forward they were only doing their duty. He noticed from a report which was given to the Committee recently that the number of applications which had been made for meters had increased since last year by 6571. He believed that if they did not take time by the forelock, they would be placed in a very unfortunate position in regard to gas supply. He was quite sure that they were going on lines that would ultimately recoup them for any additional outlay in their capital account.

Mr. Cunningham moved—"That an advertisement be made for ground, specifying the requirements as to situation, stability, extent, elevation, &c.; and that the Special Sub-Committee appointed by the Gas Committee on the 29th ult. be continued, in order that they may further consider and report on the subject; and that the Sub-Committee be made more representative by the addition of one or two extra members." He said he should endeavour to show that the whole manner in which the proposal had been brought before them had been, to say the least of it, unusual and rather objectionable; and, further, that the proposal itself was not thoroughly satisfactory. In the report it was said that numerous sites had been examined, but that this one was found to be most satisfactory. The members of the Gas Committee had not even yet learned what were the sites which were examined, and what were the objections to those sites. A report of this sort should be brought before a responsible Committee like that—for it was the Committee who were responsible—and if it were accepted by them that day, as they were asked to accept it, at a moment's notice, they would be simply shirking their duties. The Gas Committee were not prepared to do this; but they did something like it. They appointed a very small Committee, who were called upon to investigate the matter within fourteen days. He believed that a Committee like that should have been made representative of all shades of opinion in the Gas Committee. This small Committee had too little time to carry out such an immense piece of work. This statement was justified by the fact that the gentleman who submitted the report to the small Committee did so under a reservation, and it had not been taken into account. There were sites in the immediate neighbourhood of Glasgow which many of them thought would be suitable; but to state at a moment's notice what those sites were, and to defend them against any remarks which might be made, was almost impossible. He thought, therefore, that if the Committee were strengthened, and advertisements put out asking those who had suitable lands for sale to send in their specifications, there would turn out to be a lot of sites cheaper than this one. The figure given was £600 per acre.

Mr. Mitchell: I never mentioned a price.

Mr. Cunningham said there was a price before them; and he thought the sum which was likely to be paid for the site was too large. They would require parliamentary powers if they were to secure the land cheaper; and he thought it was the experience of the Council that it was not satisfactory to proceed to purchase land under the Lands Clauses Acts. There was another argument which he thought would go home to the heart of every councillor—and that was that it was not a right or proper thing to place such works in the immediate proximity either to public parks or residential districts. There was still another very important argument why they ought not, just at once, to accept the

report. The report was based on the supposition that in the future the increase of gas consumption would continue in the same ratio as in the past. He freely admitted that their Waterloo Street works, in the way of producing electricity, had not checked the increasing demand for gas. It would almost appear as if the theory put forward was justified—that where one shopkeeper took the electric light, his neighbours lighted up more brilliantly with gas, and that this put up the gas consumption. But the Council had already immense works for the generation of electricity; and by next year he had no doubt that it would not be one shopkeeper here and another there, in their main streets, who would take in electricity, but that they would have whole streets practically lit by electricity. He also believed that, in the not very far distant future, the electric light would be produced at a cost which would allow it to be put into working men's houses, so that in houses which were not too large the introduction of electricity would in the matter of health be a great and satisfactory reform. The Council had heard the statements which had been made by the representatives of the electors. He hoped they would give due weight to these arguments, and would not force upon them something which they would utterly object to.

Mr. G. Mitchell, in seconding the amendment, admitted that a new gas-works was a necessity; but he did not admit that the site which had been recommended was the most suitable. It was in close proximity to a park which had cost the Corporation something like £29,000, not to speak of the annual expenses of upkeep. It had been said that the smoke in the district was not detrimental to the health of the people. Strange to say, at least two-thirds of those who were employed in the Blochairn Iron-Works, which were in close proximity to the park, lived from half a mile to two miles from the works. This seemed to him to be a sufficient argument that people were not desirous to live in such close proximity to works which emitted smoke. As one who had lived all his days in the east-end of Glasgow, he believed that he had as fair a knowledge as anyone of the workings in the north-eastern and eastern portions of the city. He had specially asked the Committee to report upon certain pieces of ground; but this report had not been given to him yet. When they had an expenditure of a million of money involved, they should have a report submitted to them which, instead of being upon two sheets of foolscap, should enable those who believed that other places were suitable to speak to them. When the subject first came before them, it was stated that the price would be £600 per acre; but the opposition was so strong that the Committee found it necessary to say that they would purchase under the Lands Clauses Acts. Already, to complete a transaction of £2700 under the Lands Clauses Acts, had cost £700 in expenses.

Ex-Treasurer Gray said that they had, near the west-end of the city, gas-works at Dawsholm and Temple; and they had never heard that they destroyed the amenity of the neighbouring districts. Therefore he did not think there was so much in this argument as their friends were pleased to advance. He concurred entirely with the gentleman who had just spoken, that the matter had been too much hurried. It was known to Mr. Mitchell, the Convener, during the last two or three years, that new gas-works were required. But the Gas Committee were not aware of it; and why should they not have known? It was stated at the last Committee meeting that land at Balcrnock could be acquired for £350 per acre. Land adjoining Blackhills could be had at £250 per acre; and not long ago the City Parochial Board purchased land, a little further east, at £25 per acre. He was not going to object to the proposal of the Gas Committee; but it was not good to conduct their business as this was being conducted.

Mr. Paton thought there was only one course open to them—to approve of the minutes of the Gas Committee. The site, he believed, was not open to many of the objections which had been taken to it. This was by no means a residential neighbourhood. He had no doubt that, as Mr. Dobbie said, instead of doing harm to the district it would be one of the best things that could happen to it. There was necessity for coming to a conclusion at once. Mr. Foulis had told them in his report that if they did not acquire the ground and erect works, they would not be sure that the city could be supplied with gas for more than three years. In view of this fact, and that they must take the responsibility on their own shoulders and relieve Mr. Foulis, there was no course open to the Corporation but to adopt the report and go to Parliament to obtain the necessary powers. It should always be the duty of the Corporation to utilize their own land before they acquired that of other people. There was no necessity to take all the ground at £600 an acre, as they might not require more than half of it. Altogether, with the railway facilities which existed, and the stability of the ground, he thought that the proposal was the best which could be made to meet the requirements of the Corporation.

Dr. Dougan said he was one of those who believed that all public works from which noxious effluvia emanated should be put as far away into the country as possible. If after that people built houses round about the works, they had themselves to blame. He was very much surprised that a Corporation who were spending hundreds of thousands of pounds to get rid of the disagreeable effluvia from the Clyde should on the other hand place a gas-works close to residential houses, and close to a public park, where they desired the citizens from the more confined parts of the district to go out and breathe the pure air of heaven. In the neighbourhood of Alexandra Park there were numerous public works exhaling effluvia, disagreeable and dangerous to health. If they put down the gas-works there, they would almost encircle the park with works that were noxious and disagreeable. What about the other sites that had been proposed? He was not prepared to take the Engineer's or the Sub-Committee's word that there was no other ground within a reasonable distance of the city on which gas-works could suitably be built. He must be personally satisfied that such was the case before he agreed to the proposal. He could not think there would be anything serious in delaying the matter for a time. He had been on the Gas Committee for a year; and he never had heard a word said about the necessity for the erection of new gas-works. If it had been absolutely necessary, something should have been said during that time. In the face of all this, he could not support the proposal.

The Lord Provost called attention to the report of the Gas Committee dated July, 1898, which contained a paragraph to the effect that "as these extensions would exhaust the ground available for manufacturing purposes belonging to the Corporation Gas Department, it would be necessary to obtain parliamentary powers in the next session of Parliament for the purchase of additional ground for the erection of works, to meet the continued increasing demand for gas." This was three months ago. The Corporation had approved of the report; and he wished to point out that it was not therefore only since the 27th of last month that they had known about the matter. He would also say from the chair that, as a member of the Finance Committee, the late Bailie Ure, along with the Engineer, made a proposal before his death, three or four years ago, to purchase the land of Blackhill. It was perfectly well known to him (the Lord Provost) that the Gas Department were getting into such a condition that they were bound to provide new works somewhere; but, as Bailie Mitchell had said, the negotiations had been necessarily very quietly and privately carried through. They must know that if it had come out that the Corporation were on the look-out for a large piece of land for purchase, prices would have gone up against them in every district. All the members of the Corporation were aware, however, that the ground was required.

Mr. O'Hare thought they had no alternative but to adopt the report of the Gas Committee, because there was no competent opposition. Besides this, there was a responsibility upon them with reference to the gas supply. One gentleman who supported the amendment said he had as good a knowledge of the district as anyone; and Mr. Rankine took upon himself the responsibility of allowing such a report to get into print. No other professional man had reported against the site which the Committee had adopted.

A division was taken, when 52 voted for the motion, and 10 for the amendment.

MALVERN LINK GAS ARBITRATION.

(*Before Mr.* J. Shiress Will, Q.C., *Umpire.*)

At the Westminster Palace Hotel, on Monday last week, an arbitration was commenced in regard to the purchase of the undertaking of the Malvern Link Gas Company by the Malvern Urban District Council. Mr. Corbet Woodall was Arbitrator for the Company; Mr. Charles Hunt for the Council.

The Hon. J. D. Fitzgerald, Q.C., and Mr. Farrant appeared for the Company; Mr. Balfour Browne, Q.C., and Mr. Ram represented the Council.

Mr. Fitzgerald, in opening the case, said the proceedings were taken under the Malvern Link Gas Act, 1897, to determine the amount to be paid by the Malvern District Council to the Malvern Link Gas Company for their undertaking. After giving the history of the attempts by the Local Authorities concerned to buy the undertaking, he said the Company proposed to base their claim upon the accounts of 1897.

Mr. Balfour Browne remarked that the value would have to be ascertained up to the time of the transfer, which would be the 1st of January next.

Mr. Fitzgerald said the works of the Company were most admirably situated for the manufacture of gas for the supply of the whole district of Malvern Link and Great Malvern. The total income in 1894 was £2158; in 1895, £2316; in 1896, £2441; and in 1897, £2404. The decrease in 1897 was owing to the Imperial Hotel taking its custom away. The profit on gas for 1894 was £866; for 1895, £953; for 1896, £982; and for 1897, £956—being a drop of £26. The quantity of gas made in 1888 was 6,581,000 cubic feet; and in 1896, it was 13,515,000 cubic feet—having doubled in these eight years. In 1897, it was 13,324,000 cubic feet; this again being accounted for by the loss of the Imperial Hotel for the last six months. The total income for 1897 was £2735; and the total expenses were £1778—leaving a balance of £956. He proposed to take this figure, and to make the multiplier 26⅔ years. This was a non-statutory Company; but the difference in value between a statutory and non-statutory concern was very slight; being about the cost of obtaining the Act of Incorporation. There was not a single instance where competition had been allowed against a non-statutory company. Then there would be an additional sum for surplus land and surplus capacity of works; for the works were very much in excess of the immediate requirements of the district. In ordinary cases there would have been a claim for 10 per cent. for compulsory purchase; but as this was an agreement to sell, he did not think they could claim this 10 per cent. They were, however, entitled to the cost of re-investment and of winding up the Company.

Mr. *E. W. Drew*, of the firm of Alfred Lass, Wood, and Co., said he had gone through the Company's books. In 1882, Mr. Deakes valued the works at £8500; and at present the total stock issued was £10,862, and the existing debentures were £1500—making a total capital of £12,362. The capital expenditure was £12,067. The quantity of gas made from 1888 to 1895 had rather more than doubled. He calculated the profit on revenue account for 1896 at £982.

In cross-examination by Mr. Balfour Browne, witness said that the £956 of profit for 1897 had to be drawn upon for interest and dividend; and as there were £1500 debentures, the interest would be taken from the £956 before a multiplier could be applied.

Mr. Fitzgerald submitted that the other side had agreed to take the accounts of 1897 as the basis of the claim.

Mr. Balfour Browne replied that they expressly reserved the right to go into the make of gas since 1897.

The Umpire decided that they must hear the evidence and contentions of the parties.

Witness (continuing) said the figure for repair of works in 1897 was 3·65d. per 1000 cubic feet sold; but in 1894, it was 5·70d. Of course, if repairs were taken at the latter figure, the profit would be reduced. The unaccounted-for gas was 11·22 per cent. The price was 4s. 10d. per 1000 cubic feet to the public; but if they paid within a month, they obtained a reduction of 10d.

Mr. *Thomas Newbigging* said he had visited the gas-works and the district supplied. The site of the works was freehold, of about an acre and a half in extent. There was room upon the site for extensions, which would admit of a very largely increased production in the future. The situation was an excellent one, both for the delivery of coals and other materials and for the supply of the district with gas. It was connected with the Great Western Railway by a siding. The works had 16 retorts, and were capable of producing 108,000 cubic feet of gas per

day of 24 hours. The actual maximum make was 66,000 cubic feet; but this occurred only on one day. This would leave 40 per cent. excess of productive power. The covered storage was equal to 450 tons, or ten weeks' stock, based on the maximum daily consumption. This was ample. The other apparatus generally—the machinery, exhausters, boilers, condensers, gasholders, &c.—were sufficient, and most of them in excess of present requirements. The scrubber power needed enlarging. Then there were storage tanks, smithy and fitting-shop, a dwelling-house for the manager, and two cottages for workmen. The works were capable of producing gas economically. There were 11 miles of mains; and they varied in diameter from 12 inches downwards. Having regard to the district and the mileage of the mains, the unaccounted-for gas was reasonable. The structural valuation of the works was £11,964; and the capital expenditure to Dec. 31, 1897, was £12,067. The actual price realized for gas was 3s. 10½d. per 1000 cubic feet; and the consumption during nine years had risen from 6,581,000 to 13,244,500 cubic feet. The district was an increasing one, and several new streets were being laid out. The Company would be able to increase the dividend if they remained in possession of their undertaking. As to the difference in value between a statutory and non-statutory company, there was really no competition allowed in either case. Parliament would never permit a local authority to compete with a non-statutory company. The local authority must first of all purchase the company before they could set up another gas-works. As to his valuation, he took £938 18s. 9d. as the maintainable profit; and adopting 26⅔ years' purchase, this amounted to £25,038. Then in addition there was the profit on the sale of fittings of £9 7s. 2d., multiplied by five years, making £47. Again, there was excess land and surplus works £833. This included the coal-stores. They contained 450 tons; but the actual quantity required was 273 tons, so that there was an excess of 177 tons. The gross total was £26,216; and from this was deducted £1500 debentures, leaving £24,716. Adding to this 3 per cent. for winding up expenses and re-investment, £741, made a total claim of £25,457.

In cross-examination, witness admitted that in the Morley case, where he was Arbitrator for the Company, they deducted the cost of making a stand-by engine and boiler, but that was without his approval. The fact was that fully 80 per cent. of the gas-works in the country had not a stand-by in the shape of exhausters and boilers. At one time a non-statutory company used to receive 16⅔ years' and a statutory company 20 years' purchase. When money cheapened, and the value of non-statutory companies rose to 20 years, it was said the value of statutory companies was 25 years; but this was merely for want of reasoning the thing out.

Mr. *H. E. Jones* gave corroborative evidence. He agreed with Mr. Newbigging that the multiplier should be 26⅔ years' purchase. His figure for the maintainable profit was £1006, making a total of £26,826. Then the value of surplus works was £1391; and five years' purchase of the profit on the sale of fittings gave very nearly £47. His gross total value was £28,263 15s. 10d. From this he deducted the £1500 debentures; leaving £26,763 15s. 10d. He had not put anything down for re-investment or winding up expenses, which he thought should be done.

In cross-examination, witness said that he had allowed £50 more than the £956 profit on account of ammonia which at present was wasted. He made no difference between a statutory and non-statutory company. In fact, he knew some statutory undertakings that were not worth so much as non-statutory ones. He would only make some difference for the cost and the risk of applying to Parliament for an Act.

On Tuesday Mr. FITZGERALD said they had complied with the Umpire's suggestion, and the Accountants for the respective sides, Mr. Drew and Mr. Howard Smith, had agreed on the figures.

Mr. BALFOUR BROWNE: But merely as figures, leaving them to be argued upon.

Mr. FITZGERALD: Yes.

The following table was then handed in:

Malvern Link Gas Company, Limited.

We are agreed that the profit for the year 1897 may be taken as follows:—

Profit on revenue account	£957	0	0
Profit on fittings	9	0	0
Total	£966	0	0

Subject to the following:—

Income-tax	£35	18	0
Interest on temporary loans	10	7	9
Interest on debentures	65	5	0
Total	£111	10	9

The above figures are arrived at after charging revenue with the following:—

Repair and maintenance of works (equivalent to 3·43d. per 1000 cubic feet of gas sold)	£165	0	0
Repair and maintenance of mains and services (equivalent to 1·24d. per 1000 cubic feet of gas sold)	60	0	0

(Signed) ERNEST W. DREW.
HOWARD S. SMITH.

Oct. 31, 1898.

Mr. *Newbigging* was re-called, and showed that the production of gas and the profit since the 1897 figures were got out had largely increased.

Mr. *John Gould*, the Manager of the Company, spoke as to the condition of the works. He said that the mains were very good. The soil was marl and clay, and it did not corrode or eat the pipes.

Mr. BALFOUR BROWNE then opened on behalf of the District Council. He said the case was unique, and the Arbitrators would not have to value the undertaking on ordinary lines. It would not do to take the profit shown on the books, because it was easy to make large profits if they kept down the working expenses; and the particular year agreed upon (1897), the working expenses were kept down by reason of an unduly small expenditure on repairs and maintenance of the works and mains.

Mr. CORBET WOODALL: The working expenses in 1897 were considerably more than in 1896.

Mr. BALFOUR BROWNE said that might be so. There were some working expenses that could not be kept down; but a very usual way was to scamp the repairs and maintenance, which increased the amount that could be carried to profit for that year. Taking the agreed figure of £957, this was not all profit, because there was included the interest on debentures. This was an outgoing; and the Company treated it as if it actually went into their pocket. By multiplying the £65 5s. by 26⅔, they brought up the debenture capital to £2000, while, as a matter of fact, it was only £1500; and the juggle was that in capitalizing it the Company had got it at £2000, but in deducting it they had only taken £1500—leaving the Council to pay £500 for debenture stock. This was wrong in principle; and he was sure the Court would not allow it.

The UMPIRE: Mr. Fitzgerald's argument is that when the undertaking comes into the hands of the purchaser, the latter will be able to borrow at a less rate of interest, and therefore his policy will be to pay off the debentures.

Mr. BALFOUR BROWNE: Certainly.

The UMPIRE: But it struck me that this was looking at the value of the undertaking when it comes into the hands of the purchaser.

Mr. BALFOUR BROWNE: It is; and that, of course, is improper.

The UMPIRE: I am not deciding it, but only mentioning it so that Mr. Fitzgerald may deal with it when he speaks.

Mr. FITZGERALD: Being terminable, if the undertaking had remained in our hands we could have paid the debentures off by the end of next year, and replaced them with a 3 per cent. loan.

Mr. BALFOUR BROWNE: That is a possible way of looking at it; but it is wrong, because you are going to take, not what the Company might have done, but what the condition is to-day. What you have first to arrive at is the maintainable profits that the shareholders can get.

The UMPIRE: Yes; but mind, I do not express a decided opinion.

Mr. BALFOUR BROWNE continuing, said it must be a mere accident that the shareholders could have lent this money; and therefore he contended that the Court would not allow it. Going to another matter, Mr. H. E. Jones had thrown in £50 for ammonia, which he saw was now wasted. This had never been earned; and to say that the Council might earn it when the undertaking came into their hands was sinning against the canon accepted by Mr. Fitzgerald that they could not look at the value in the hands of the purchaser but in the hands of the seller. Mr. Jones had pitch-forked £50 into profits, which was not earned, and which it would require considerable expenditure to earn; and therefore he asked that this should be disallowed altogether. Then he (Counsel) took out the debenture interest, and added £26 9s. 9d. as working expenses—leaving £854 12s. 3d. as maintainable profit, as against the £938 18s. 9d. of Mr. Newbigging, or the £1006 of Mr. Jones. Coming next to the crux of the case, by what was this amount of £854 to be multiplied so as to arrive at the capital sum? The figure the Company had put was 26⅔, as if it were the best established non-statutory concern in the world, instead of being the worst. Mr. Newbigging said the Company was worth this large number of years' purchase, because the Local Authority would not be allowed to compete. But the Company were not only not protected from competition, but the Urban District Council of Malvern had an absolute right to compete with the Company in the Malvern Link district. When they were before Parliament, they did not even think of protecting themselves against competition when the question was raised. The Link District Council got a clause inserted to prevent further competition. If he had been acting as Counsel for them when they obtained their Extension Order, and if the Company had asked for a clause against competition, he would have advised that it was a fair thing; but as they had not done so, they must suffer for their *laches*. This placed the Company in a very insecure position at present; and their undertaking must be valued accordingly.

Mr. CORBET WOODALL: When your clients became Malvern Link, did you not at the same time take over the agreement to purchase the undertaking of the Gas Company?

Mr. BALFOUR BROWNE: You must assume, for the purpose of valuing these works, that the Company is still existing and is going to exist. My clients are the Local and the Gas Authority, with power to lay mains and pipes and supply gas within this poor deluded Company's area. In the Provisional Order of 1867, my clients were enabled to establish gas-works; and we have now £3000 a year in hand with which to lay mains and compete, without having to go to the Local Government Board to borrow money, in which case we might be compelled to purchase the Company. We have power to borrow £80,000. I contend that, taking the profit of £854, you could not multiply it by anything; but in case you should take a different view, I have asked my witnesses to assume that the Council would have to go to the Local Government Board, and to fix a proper multiplier. The multiplier my witnesses (Mr. Colson and Mr. Valon) have adopted is 22 years, which comes to about £18,801. Then there is another claim—a monstrous one—on the part of the Company. They say they have got surplus land and surplus works, and the way this is calculated is to take a particular part of the works—condensers, or something—and say it is doing so and so, but it might do a great deal more. The only thing, however, in which the Company can legitimately claim to have any margin at all is the surplus land. My witnesses will say that the gasholder capacity is deficient, as there is only three-quarter's of a day's supply; and we deduct something for this. To our total of £18,801 9s. 6d., we add for surplus land £204—making £19,005 9s. 6d. From this we deduct for deficiencies in condensing and scrubbing apparatus £200, and for deficiency in gasholder room £390, which leaves £18,415 9s. 6d. But to this has to be added five years' profits on the fittings, making the total £18,462 5s. 4d. The calculation which brings out this large figure is the basis that my learned friend has gone upon; but if the Court accept my argument that there is no prospective value, a very large deduction must be made.

Mr. *W. A. Valon*, in reply to Mr. RAM, said the works were on a suitable site, and were, for their class, very good. They had not any margin in regard to the retorts; and the coal storage, which was sufficient for about nine weeks, was ample, but not in excess. Neither the condenser nor the scrubber was sufficient. There was no more exhauster power than there should be. There was a deficiency of 13,000 cubic feet between the maximum make and the gasholder room. He estimated the structural value of the works and plant at £5355, and the land at £535. The total length of mains was 17,804 yards; and their value, £4499. Adding £302 for the meters and £112 for the stoves, brought his total valuation up to £10,803. Witness was then taken through his valuation of the undertaking (which proceeded on the assumption that there should be 22 years' purchase of the maintainable profit), and brought out a total

figure of £18,462 5s. 4d. When settling this figure, he had not been aware of any question being raised as to the legal position of the Company. He maintained that it was right to deduct the interest on debentures from the gross profit in arriving at the maintainable profit, and did not believe in the Company being able to pay off their debentures and obtain a loan at 3 per cent. If Great Malvern were to compete in the Link district, the Company would at once have to lower their price to that at present charged by the District Council; and this would mean a loss to the Company of nearly half their existing profits.

Mr. *Howard Smith*, of Messrs. Howard Smith, Slocombe, and Co., chartered accountants, having stated upon what information he had prepared the accounts used by the District Council in the case,

Mr. *Alfred Colson* said the capital account of the Company stood at £11,665, or £1014 per million cubic feet of gas sold, which was a high figure. His structural valuation came to £11,036. Leaving out the legal question as to the possibility of competition, he had capitalized the maintainable profit at 22 years' purchase, which was equivalent to the 4½ per cent. table. He brought out the total value of the undertaking at £18,408.

Mr. *Henry Maybury*, Gas Engineer and Manager to the Great Malvern District Council, said the Council were making a profit on the sale of gas in Malvern of from £2500 to £2800 a year. They were supplying gas at 3s. 2d. per 1000 cubic feet.

Mr. Balfour Browne, in closing his case, said nothing ought to be allowed for winding up and re-investment. If the undertaking were owned by one man, no winding up would be necessary; and it would not make a bit of difference to the purchaser that, instead of the works being owned by one man, they were owned by a Company. That was the Company's look out. In the Morley Act, which was passed last session, in order to give the Company the cost of winding up, a clause was specially introduced. Of course, the Umpire would not forget that Mr. Valon's and Mr. Colson's valuations were on the assumption that he (Mr. Balfour Browne) was wrong in his law. If he was right in his contention, their figures would be of very little assistance to the Court, because they were assuming a protected Company, while he said the Company had no protection whatever.

Mr. Fitzgerald, replying on the whole case, said Mr. Balfour Browne's point of law amused him, as the Company were being bought up under the Malvern Link Gas Act, 1897, which made it compulsory on the Link Council (whose obligations and liabilities were transferred to Great Malvern) to carry out a contract to purchase the Company, which was scheduled to the Act. If his learned friend was instructed to put forward such a contention, nothing more dishonest or more disgraceful had ever happened in his experience. But he believed it was really one of those flights of fancy by which Mr. Balfour Browne from time to time enlivened the monotony of arbitrations. Great Malvern had for forty years possessed the power to compete, but had never exercised it; and the power was absolutely taken away from them by the Act of 1897. In regard to the multiplier, it was impossible to say that there was any hard-and-fast rule; but looking to the fact that it was an improving Company, he thought his witnesses were justified in taking 26¾ years' purchase, as against the 22 years of the other side. He was not entitled to compensation for disturbance; but he was entitled to the actual cost of re-investment and winding up.

Mr. Balfour Browne: My learned friend has just said that our view was dishonest, and then he said that it was a flight of fancy. But it is my own fancy that we should succeed; and I should like the matter put in the form of a special case.

The Umpire: You are entitled to a special case if you desire it. I do not know whether it will fall to me to decide this ultimately; but if it should, I do not propose, unless the parties wish it particularly, to have a "view." I shall weigh the evidence, and go by that.

This concluded the proceedings.

Gas Workers' Wages.—The West Ham Gas Company have granted an increase of 5d. per day to their men.

Steyning Water Company, Limited.—The first annual general meeting of the Steyning and District Water Company was held on Monday last week, under the presidency of Dr. T. Fuller. In submitting the report of the Directors, the Chairman explained that several attempts had been made to obtain a suitable site, and experiments had been conducted at various places. The well they had decided upon near Beeding would yield 210,000 gallons a day, and the water was of an exceptionally good character. The contracts for pipes and the construction of a reservoir were to be offered for public tender; and it was hoped that in six months all would be well supplied. The report was adopted.

Proposed Extension of Bradford.—On Saturday, the 29th ult., an important inquiry conducted by Major-General Phipps Carey, on behalf of the Local Government Board, in regard to an application by the Bradford Corporation for permission to extend the boundaries of the city, was brought to a close. About fifty local authorities, gas companies, hospital boards, and large property-owners, affected by the scheme, were represented; and the proceedings lasted, without intermission, from the 20th ult. to the above-named day. In the course of the inquiry, the Town Clerk of Bradford (Mr. G. M'Guire) stated that the original idea of the Corporation was to purchase the undertakings of the several Gas Companies in the areas proposed to be annexed; in fact, the Town Council had, by resolution, pledged themselves to do this. In the case, however, of the larger portion of a Company's district being unannexed, only the part taken in would be acquired. An alternative proposal was to buy gas in bulk, and distribute it in the annexed districts at the Bradford price. On the closing day of the inquiry, Mr. John Niven, Engineer and Manager of the Clayton, Allerton, and Thornton Gas Company, gave evidence. He stated that, in addition to the places named, his Company supplied Denholme and Wilsden; the price being 2s. 6d. per 1000 cubic feet net. By being annexed to Bradford, Clayton would gain £307 19s. 1d., assuming all consumers had a discount of 5 per cent., which he did not think they would get. Replying upon the evidence, Mr. Balfour Browne, Q.C., for the Corporation, invited the Inspector not to concentrate his attention either upon Bradford or upon the outside places, but to look to the interests of the whole community that would form Greater Bradford in the future, and come to the conclusion that the proposed extension should be carried out.

LOUGHBOROUGH GAS-WORKS PURCHASE QUESTION.

The Ratepayers Consent to the Promotion of a Bill.

A Meeting of ratepayers and property owners of Loughborough has endorsed the proposal of the Corporation to promote a Bill in Parliament, to enable them, among other things, to acquire the gas-works and establish an electric lighting plant. The Mayor (Alderman W. Tidd) presided; and, in opening the proceedings, said he thought the ratepayers would agree with the Council that the present was an opportune time to seek powers to purchase the gas-works. He formally proposed a resolution, consenting to the promotion of the proposed Bill in Parliament, and to the opposition of any Bill introduced by the Gas Company for increased powers. Alderman Godkin, in seconding the motion, observed that thirty years ago a proposition to the same effect was mooted in the town, but fell through because it was then reported that the town, with a population of 11,000, was never likely to grow beyond that; but since then it had doubled. It must not be taken that the Council had any antipathy to the Gas Company, who had only done what they thought to be necessary to make their business pay. If, however, it was worth the while of the Company to borrow more money, it must be well for the Corporation to proceed on the lines proposed. Mr. Faulks, a member of the Council, in supporting the resolution, said that from 1836 to 1838 the capital of the Company was £13,330. It was increased, in 1868, to £25,000; and in 1886 to £40,000. Had the Corporation purchased the undertaking between the years 1836 and 1868, they would only have had to pay the premium price on £13,330; or between 1868 and 1886, on the £25,000. Now they had to purchase at the premium price on £40,000; and if they allowed the Company to borrow £15,000 or £20,000 more, they would later on have to pay the premium price on that also. Many questions were asked, in reply to which it was stated that there need be no fear as to the Corporation not getting the works at a fair price. The price of gas was at present 2s. 10d. and 2s. 11d. per 1000 cubic feet; and Parliament would fix the terms upon which the Corporation would be allowed to supply it. Asked whether all methods had been tried to purchase the works without reference to compulsory powers, Alderman Godkin said the Council had approached the Company fairly, and made offers to them; but they would not enter into negotiations, and said they did not want to sell. The Corporation then inquired if the Company would allow an expert to inspect the works; but they set their backs against that also. On the motion being put, it was carried with only one dissentient—a member of the Council.

BRIGG DISTRICT COUNCIL AND THE GAS-WORKS.

The advisability of purchasing the local gas undertaking was discussed by the Brigg District Council last Tuesday. The matter was introduced by Mr. J. Spring, who presided. He said the question had been prominently brought before him recently by statements made by Chairmen of other District Councils who had acquired similar property. The general experience was that considerable profit had been derived from gas undertakings, and that this had resulted in a reduction of the rates. At present the Gas Company had no statutory powers; but since this meeting of the Council was summoned, a communication had been received from the Secretary stating that next session it was the intention of the Company to apply for a Provisional Order. Under these circumstances, he thought the Council should immediately deal with the matter one way or another. Considerable discussion ensued; several members expressing the opinion that the electric light might in the near future supersede gas. But there was a general feeling that preliminary steps should be taken in the matter of purchasing the gas-works; and it was resolved that a meeting of the Council should be specially summoned to consider the proposal. In the meantime, the Clerk was instructed to write to the Company inquiring whether they were willing to sell their undertaking. A Committee was also formed to consider the matter, and to inquire into the cost and feasibility of introducing the electric light into the town.

THE MUNICIPALIZATION OF GAS-WORKS.

Terms of Recent Transfers—Mr. George Livesey's Views.

The owners and ratepayers of Reigate will shortly be called upon to determine by their votes whether or not the Corporation are to go to Parliament next year for power to acquire the undertakings of the local Gas Companies. The Town Council, as already reported, have decided, with one dissentient, that this course shall be taken; and they are now only awaiting the result of the poll, which will take place on the 25th inst., to confirm or countermand the instructions given to the Parliamentary Committee to proceed. The views of the ratepayers are, of course, being freely expressed in the local papers; and an influential Committee, formed to support the decision of the Council, have issued a circular reminding the ratepayers that the present is their "last chance" of securing the gas undertaking, and setting forth the reasons for purchasing it. It is scarcely necessary to deal with these or with the general correspondence. Two communications, however, deserve notice—one by a "Special Correspondent," and the other by Mr. George Livesey, who, as a resident in the locality, naturally takes an interest in the question. The former gentleman's letter is as follows:—

Now that the Reigate Town Council has decided to promote a Bill for the purchase of the Redhill and Reigate Gas Companies, it will not be uninteresting to inquire as to what is likely to follow. After what occurred in Parliament in the early part of the year, the probability, if not the certainty, is that the Bill to be promoted by the Corporation will be passed; for in recent years the Legislature has looked with increasing favour upon the purchase of gas undertakings by municipal bodies. Rarely has a Purchase Bill promoted by a local authority been thrown out. A case did occur last year, when a Bill promoted by the Stirling Town Council was rejected; but the result was due more to dissensions

in the Town Council itself than to any question as to the desirability of the municipalization of the gas-works. The sequel to the rejection was that the Stirling Gas Company secured a Bill this year; and now the members of the Stirling Town Council are busy trying to shift the responsibility to one another's shoulders. That the present feeling of Parliament is in favour of municipalization is proved by what happened in the case of Yeovil this year. The Yeovil Corporation and the Yeovil Gas Company promoted competing Bills—the one for the purchase of the gas undertaking, and the other for extended powers. It was proved that the Company had conducted their business in an unexceptionable manner, and yet the Corporation's Bill was passed in preference to that of the Company. The only concession made to the Company was the insertion of clauses in the Corporation's Purchase Bill enacting that the purchase price, to be settled by arbitration, is to be fixed on the most liberal basis possible. This arbitration has not yet been held. When it comes off, it will be well worth following, as it is generally admitted by experts that it will create a new precedent in gas-works arbitrations; and it may be found to have some bearing upon the Redhill case.

Several more or less important arbitrations have taken place within the last few years, which it may not be uninteresting to consider for a moment. The prominent feature in them all has been the wide difference between the amounts asked and offered for the undertakings. The method adopted of arriving at the value of a gas undertaking is to ascertain the maintainable annual profit, and to multiply that by a certain number of years. The theory is that the amount given should be sufficient to enable the shareholders of the bought company to secure an equal income from an equally safe investment. This affords much scope for the ingenuity of the experts who are called in to assist the arbitrators. They first differ as to the maintainable profits, even though the company concerned may have been paying regular dividends for years. An outsider would think that in such a case the maintainable profit would be the dividend; but the experts do not look at it in this simple light. The company's witnesses strive to show that a larger dividend could be paid; and the experts on the other side insist that if the works were kept in a proper state of repair, and gas sold at a reasonable price, the dividend could not be paid. As an instance of the disputes that may arise as to what the maintainable profit is, the Ashford Arbitration, held last year, may be cited. Parliament had fixed that the purchase price was to be 24 times the maintainable profits—that is, 24 years' purchase—and, therefore, all that had to be ascertained was the amount of the maintainable profit. A simple process one would have thought in the case of an undertaking enjoying a virtual monopoly. Yet the Company's expert witnesses said the maintainable profit would be between £2200 and £2300; and the Local Authority's witnesses said it was only £1100. The Arbitrator decided that the right figure was £1420.

It is seldom, however, that Parliament thus simplifies the arbitration by fixing the number of years' purchase. It is clear that the more the years' purchase secured by the selling company the better security will the shareholders be able to obtain to yield them the same income. Suppose a company paying a 10 per cent. dividend. If that is bought at 25 years' purchase, the shareholder can re-invest his money in a good 4 per cent. industrial preference stock, and still enjoy the same income. If he gets only 20 years' purchase, he must re-invest in a riskier 5 per cent. stock to secure the same income. If he gets 30 years' purchase, he may enjoy the security of the stock issues of a big municipal corporation. The result is that there is always a big fight over the number of years' purchase to be given. In a case that occurred in 1896—that of Matlock Bath—the difference between the two sides was no less than 8¾ years. The Company claimed 26¾ years, which is a favourite figure nowadays, and the Local Authority offered 18 years. As there is never agreement as to what the maintainable profits are, and the arbitrators give only lump sums in their awards, one is precluded from comparing the demand and the offer with the sum paid in terms of years' purchase; but in the case of Matlock Bath the total sum awarded was £16,726, against £26,000 asked and £9000 offered. In a case just settled—that of Morley—30·77 years was asked; representing, according to the Company's view of the maintainable profits, a purchase price of £134,000. The Corporation offered 25 years' purchase of a much smaller maintainable profit, giving a total of £80,000. The award is £109,866. In the Ystrad arbitration last year, the Company's witnesses put the value at between £202,000 and £204,000; while the Local Authority's figures were between £86,000 and £94,000. The award was £126,049. The Cowes Gas-Works were also transferred last year. The sum asked was £60,000, and the sum offered just half. The award was £52,150, which was equal to about 27 years' purchase of the previous year's profits, without any corrections to arrive at the maintainable profits. This year the Swadlincote Gas Company asked £52,000, was offered about £20,000, and received £34,200. In 1896, the Falkirk Company asked more than £115,000, was offered £40,000, and received £77,050. In the same year, the Chesterfield Company asked £220,000 and received £106,500. Perhaps these recent instances are sufficient to show that prophecies about the results of gas-works arbitrations are not to be rashly indulged in by the prophet who has any regard for his reputation.

Mr. Livesey began his letter by requesting that, as his name had been somewhat freely used at the recent public meeting of ratepayers, and opinions and statements attributed to him which, if not corrected, might mislead the public, opportunity should be given to him to put them right, and make some general remarks on the subject of the purchase of gas undertakings by local authorities. He then proceeded as follows:—

I am not, and never have been, a shareholder in either Gas Company; and not residing in Reigate, I am not a ratepayer. But I have an interest in the question of cheap gas as a consumer in the Reigate Company's district. I do not know what statement of mine could have led the Mayor to say that I "told him that there was no gas company in the world that could stand against a corporation," because I hold an exactly opposite opinion. Nothing in the way of business would give me so much satisfaction as to see the gas supply on the north of the Thames administered by the London County Council, while that on the south remained in its present hands. The satisfaction would be derived from the competition, not from the purchase of the northern Gas Company, for I should regard the latter as a great misfortune for the gas consumers; and the same may be said in regard to Reigate.

The supply of gas is, and always must remain, a monopoly; and that being so, it is surely much better for the consumers to be supplied by a company, subject to modern legislation, whereby it is made to the interest of the company to serve the consumers well, and with the additional advantages of the municipality to see that the parliamentary requirements are fulfilled, than for the monopoly to be in the hands of the municipality. In the latter case, there is no protection for the consumers. The municipality has no interest in doing well by them; its only interest being to extract as much as it can, or as it dare, from their pockets for the benefit of the ratepayers, who are by no means the same body as the consumers.

English municipalities are always anxious for large surplus profits from their gas undertakings to be paid over to the borough fund in aid of the rates. In Scotland it is illegal, as it certainly ought to be in England, to make these surplus profits, which are very easily obtained by the simple process of charging a higher price for gas than would otherwise be necessary. By the Scotch system, gas is supplied at a price high enough to cover all legitimate charges—viz., for manufacture, administration, interest on the loan capital, and the sinking fund to pay off the loan or debt within a fixed term. If from any cause, such as an increase in the cost of manufacture, the receipts are not sufficient to meet all these fair and proper charges, the price of gas is of course raised; consequently, the entire burden and risk connected with the undertaking and the redemption of the debt is borne by the gas consumers. It is therefore unjust to extract from them any surplus profits to help the ratepayers, who bear none of the burdens and take none of the risks of the business. Why, then, should they take profits to which they are not entitled. To describe such action there is only one word—"robbery"—that is applicable. It is, in short, robbing Peter the consumer to pay Paul the ratepayer. If it is said that consumers and ratepayers are the same, the answer is that many ratepayers either do not consume gas at all—possibly the Electric Lighting Order will soon come into operation—or they use very little gas; while others use much above the average. Therefore the taxation of gas for public purposes is most unequal, and consequently unjust.

There appears to be an opinion that it is only necessary to promote a Bill for purchase, and that Parliament, as a matter of course, will give the power. I am not aware that such a request has ever been granted against a company under an Act of Parliament like the Redhill Company, or against any company when that company has not also had a Bill of its own before Parliament. The probability, therefore, is that the Council will be "sent empty away," somewhat sadder, wiser, and poorer than when they with so light a heart entered upon this business. If purchase were approved by Parliament, it would be on arbitration terms, with 10 per cent. above the full value added for compulsory purchase. It is, therefore, perfectly certain that the Mayor's estimate of £161,000 for the two Companies is wofully under the mark. Nothing less than 28½ years' purchase of the maximum dividend is now given for statutory companies; 28¼ years' purchase was the rule five years ago, and since then the value of gas shares has risen very considerably. It is therefore very improbable that less than 30 years' purchase would be awarded for Redhill, with 10 per cent. in addition for compulsion.

As to the Reigate Company, being non-statutory, a few years' less purchase would be awarded, of course, with the extra 10 per cent. for compulsion. Add the expenses of the arbitration, which the town would have to pay, add also working capital and money for extensions, and there will not be much left out of a quarter of a million, on which interest at about 3 per cent. and the sinking fund of about 1 per cent. make the total charge not less than 4 per cent., or some £10,000 a year. This being considerably more than the total earnings of the two Companies, which the Mayor took at £8500 a year, the deficiency must be met either by economies and improvements in working or by an increase in the price of gas. Judging from what one sees of the business capacity of the Town Council, it is very unlikely that the deficiency would be made up by the first-mentioned plan, but rather that the much simpler method of increasing the price of gas would be adopted. Seeing how hopelessly the Town Council is divided by the mutual jealousy of Redhill and Reigate, is it not possible, if the Gas Companies were purchased—one being in Redhill and the other in Reigate—that this would prove an additional bone of contention, and a further obstacle to good management?

I now come to the other side of the question. The Mayor said: "Mr. Livesey was so disgusted with the greed of the Reigate Company that he has refused to have anything to do with them since." I did say that they were very greedy; but not that I had refused to have anything to do with them. I never have advised or assisted them in any way, and have never been asked to do so, though I have advised the Redhill Company. The Reigate Company, in their own Bill of last year, which was not proceeded with, put their expended capital at £20,000 with a 10 per cent. dividend; but by the terms of the proposed amalgamation with Redhill (inserted in the Redhill Bill), the Reigate Company's paid-up capital was put at £35,000, at 7 per cent., equal to £24,500 of 10 per cent. I told the Redhill Company that this was excessive. But the mischief was done; and it was this greediness which wrecked the Bill. They have also for a considerable time charged too high a price in Reigate. Their profit, which the Mayor puts at £3500 a year, is equal to 17½ per cent. on their capital, while they are actually paying 12 per cent., or £2400 a year. The difference of £1100 at least ought, in common fairness, to go to the consumers in the shape of a reduction in price. The Redhill Company make no surplus profit; but I think improvements might be made there which would also enable them to reduce the price.

Having said so much on both sides, I feel it incumbent upon me to say a little more to indicate in fact what appears to me the best course for all parties—the consumers, the Companies, and the town. The first step is to bring the Town Council and the Companies into friendly co-operation for the common good of the consumers. This is probably hopeless; but for all that it is right. The antagonism so generally shown by public authorities to gas companies—there are faults on both sides—does nothing but harm. Failing friendly co-operation, however, there is no question that the right thing is for the Companies to amalgamate on fair terms. The Reigate Company must be content with £20,000 of 10 per cent. sliding-scale capital, which, considering they would then have statutory powers, would place them in a better position than that which they now occupy, and would set free £1500 a year to go towards a reduction of price. This reduction would, in its turn, entitle them to an increase of dividend under the sliding-scale. Moreover, the

Amalgamated Company would be large enough to pay a fair salary to a competent engineer and manager, which neither Company is sufficient for at present. Improvements and economies could then be effected that would benefit Companies and consumers alike; and I see no reason why in a short time a material reduction in the price of gas should not be made. If the Town Council and the Companies could meet in friendly conference to agree upon the terms of a Bill to be promoted by the Companies, all would be well; but if not, the only alternatives for the Companies are either to remain in their present unsatisfactory state, or to promote a Bill independently of the Town Council, but most certainly not concurrently with the Council's Bill for purchase.

The municipal ownership of gas-works is perhaps the most striking survival, or revival, of—

> "The good old rule, the simple plan,
> That they should take who have the power,
> And they should keep who can."

They certainly do take that to which they have no right from the consumers; and but for the fact that gas companies still exist, they would take and keep more. In short, it is only the comparison with the companies that compels them to make any reduction. Were there no companies, gas would be maintained by the English corporations at a uniformly high level, and no further reductions would ever take place. On these grounds, I object to the extension of the socialistic principle of municipalizing gas undertakings anywhere and everywhere.

SOUTH AFRICAN LIGHTING ASSOCIATION, LIMITED.

Increased Storage at Port Elizabeth.

Our readers may remember that a few months ago we noticed the holding of a concert in the steel tank for the new gasholder at the Port Elizabeth works of the South African Lighting Association, the contract for which had been placed with Messrs. S. Cutler and Sons. The firm only commenced operations at the beginning of the year, and the tank was up by the 24th of May. Some idea of the size of the structure may be gathered from the fact that about 500 people were comfortably entertained on the occasion above referred to. It is 74 feet in diameter, 18 feet high, and holds 1,300,000 gallons of water, weighing 5872 tons. As the part of the town on which the tank stands was originally bog, the Engineer of the Association (Mr. W. Arnott) laid a good concrete foundation on the surface, and the tank was erected upon it. The guide-framing of the holder, which is in three lifts, rises to a height of 75 feet; the storage afforded being 200,000 cubic feet, or three times the present capacity. The plates of the holder were all hand-riveted; something like 100,000 rivets being employed. The work of erection has been personally superintended by Mr. Arnott; and it was successfully completed early last month. The gradual rising of the holder on being tested was watched with considerable interest—some Kaffirs gazing open-mouthed at the phenomenon. In addition to the new holder, extensions of the manufacturing plant have been carried out, including four settings of retorts, with Gibbons's generator furnaces.

In connection with the filling of the tank, an interesting discovery was made. As already mentioned, the tank holds nearly 1½ million gallons of water; and to have taken this large quantity from the town supply would have withdrawn about half of it, and would moreover have cost several hundred pounds. A well was therefore sunk on the premises; but, after going down some 30 feet, no satisfactory flow was found. While the excavation was proceeding, a copious fresh water spring was struck within a few feet of the surface on another part of the premises; and it was found to yield 140,000 gallons of water a day. From this source the tank was soon filled with a pulsometer pump, at a cost of only a few pounds.

Kingsbridge Water Supply.—After considerable negotiation with the owner of the Borough Estate, the Kingsbridge Urban District Council have decided to apply for a Provisional Order for the purchase of land for the construction of water-works. Mr. J. S. Hurrell, the Chairman of the Council, stated at a recent meeting of that body, that Mr. E. Sandeman, Water Engineer to the Plymouth Corporation, confirmed the opinion previously expressed that the Borough scheme was the best. The owner of the estate had offered to sell it for £10,000; but was informed that the highest price the Council could afford to pay was £7500. Subsequently the offer was increased to £8000, but it was declined; and the only course now open was to apply for a Provisional Order.

The Quality of the Upper Derwent Waters.—It will be remembered that the Leicester Corporation are now maturing a Bill to obtain power to impound the waters of the Upper Derwent and Ashop, and convey them to Leicester—a distance of 66 miles—at a roughly estimated cost of £1,500,000 sterling. As, however, several of the local medical men have expressed the fear that the water might introduce "Derbyshire neck" into Leicester, Sir Edward Frankland was consulted on the subject. His reply is considered both reassuring and satisfactory. "No fear," he says, "need be entertained that this disease could be introduced into Leicester by the supply to that town of the upper waters of the River Derwent. The districts in Derbyshire which suffer from the disease are situated upon the coal measures, which impart to the water flowing over, or percolating through, them an extreme degree of hardness, caused by the solution of salts of lime and magnesia; and it is well known that such hard waters favour, if they do not actually cause, the disease in question. On the other hand, the soft waters of Derbyshire, such as those supplied to Manchester, Macclesfield, and Buxton, produce no such effect. The contemplated supply from the upper reaches of the Derwent, besides possessing an extremely high degree of organic purity, is remarkably soft, being almost absolutely free from salts of lime and magnesia. It is, in fact, for all dietetic purposes, one of the most excellent waters in the kingdom." It appears that "Derbyshire neck" is at present not unknown in Leicester. So far, therefore, from the disease being increased by the introduction of the pure and soft water of the Derwent, Sir E. Frankland thinks the hope may be entertained that by the use of a water having only one-seventh of the hardness of the present supply, the disease in the town may be entirely extinguished.

GAS APPLIANCES AT THE BREWERS' EXHIBITION.

There was no very striking novelty, as far as gas appliances are concerned, at the Brewers' Exhibition, held at the Agricultural Hall, Islington, last week. In the domain of lighting, the incandescent gas system was again well represented. The Welsbach Company occupied their accustomed place at the end of the arcade leading to the hall from the Islington Green entrance; and a splendid display they made. In the hall itself, various other incandescent gas-burners—the solid-cone, "Daylight," Wilson, Somzée-Greyson, &c.—were to be seen, either at special stalls or employed in lighting exhibits; and Mr. C. Maynard Walker showed his "Electricpatt" wind and weather proof gas-lamp, suitable for use with incandescent or any other burners. As on previous occasions, the gas-stove makers were well to the front—Messrs. Arden Hill and Co., the Davis Gas-Stove Company, Limited, and Messrs. Richmond and Co., Limited, all making good shows; while Messrs. S. Clark and Co. had, as usual, an excellent assortment of gas and oil bar-stoves, mullers, &c. The use of gas for motive power was exemplified by the well-known types of engines supplied by Messrs. Crossley Bros., Limited, and by Messrs. J. E. H. Andrew and Co., Limited; Messrs. Lawton and Parker, of Openshaw, showed their improved "Otto" engine, for which Mr. J. Lawton was awarded a silver medal at the Industrial Arts and Manufacturers' Exhibition at Manchester; Messrs. Blackstone and Co., of Stamford, had at their stand a gas and an oil engine driving dynamos; and the "Gardner" engine, specially designed for running up to high speeds for electric lighting, was shown by Mr. G. F. Zimmer, of Mark Lane. At the stand of this gentleman was to be seen one of the most interesting exhibits in the hall. It was a full-size working model of the Kreiss swinging conveyor, which is largely in use on the Continent for transporting materials of various kinds. As shown, it was conveying grain; but it will, of course, carry coal or coke, and we believe it has been adopted for this purpose in the gas-works at Zurich and Geneva. The appliance consists of an open trough, fixed on inclined springs, either on the floor or suspended from the ceiling. The trough is set into a shaking motion by means of a small countershaft and crank. The material, which is deposited in one end of the trough, travels steadily forward to the other. The trough can be made any length, and can be extended without disturbing the driving-gear. The conveyor may be driven at any point; thereby enabling the driving power, which is stated to be small, to be taken from the most convenient source. Another exhibit which may find a place in gas-works was the Bundy time-recorder, by which every workman records his own time. It is a simple and ingenious clockwork arrangement, and is already in use at the Eastbourne Gas-Works.

ELECTRIC LIGHTING NOTES.

Last Saturday evening, the shops and private residences around Hampstead High Street were in partial darkness, the Vestry's electric lighting installation having temporarily failed.

The electric light seems to be a success in the little town of Chagford, on the verge of Dartmoor. At a parish meeting last week, it was stated to have been satisfactory from the public lighting aspect, and the arrangement with the owners for the lighting of the streets during the present winter was renewed. As there was a balance in hand on the lighting fund, it was decided to levy a rate of only 1½d. in the pound on houses and ½d. on land, as compared with 2½d. and ¾d. last year.

On the application of Alderman Page, the Lincoln City Council agreed last Wednesday to seek the permission of the Local Government Board to borrow an additional £19,000 for electric lighting purposes. The information laid before the Council was to the effect that about 4 miles of cable had been put down, and that the light would be available in a few weeks at most. To meet the demands of the citizens, the Council found it already necessary to extend the mileage to about ten, and the capacity of the works from 5000 to 18,000 8-candle power lamps.

The West Hartlepool Corporation have not yet (says the "Northern Echo") been able to adjust the difficulty which has arisen with regard to the plans for the electric lighting station. It will be remembered that those originally submitted by Professor Kennedy would have entailed a cost in carrying out far beyond his first estimate (see *ante*, p. 825); and though he has forwarded revised plans, the Committee entrusted with the matter appear to be unable to come to a satisfactory decision respecting them. They have therefore invited him to visit the town for the purpose of thoroughly discussing the matter. From all this it would seem that there has been a blunder somewhere respecting the original estimate as to the cost of a station adequate to local requirements.

A special meeting of the Glossop Town Council was held yesterday week to determine whether or not a resolution to apply for a Provisional Order to enable the supply of electricity should be rescinded. Captain Partington presented a petition, signed by 933 persons, protesting against the Corporation undertaking the supply; and he moved that the former resolution be rescinded. He pointed out that the petition had been signed by a number of mill and large property owners; and he contended that the scheme would be a financial failure. He was not at all against the electric light being introduced into the borough; but those people who wanted it should pay for it, and not tax the remainder of the inhabitants of the district. It was eventually decided that the Council should apply for the Provisional Order; but notice of motion was given to discuss on Nov. 9 as to whether or not the Corporation should transfer the Order to a private Company.

The relations between the Ilfracombe District Council and the Gas Company appear to stand upon an unusually good footing. Recently negotiations were opened up with the Council by the Electrical Distribution Company, who were anxious to acquire the powers possessed by the Council for the supply of electricity in the district. The Company made proposals which very favourably impressed the Council, and were described by the Chairman (Mr. H. Braund) as excellent. Good as they were, the Council appear to have concluded that the whole of the advantage of the concession would not be on their side; and before closing with the offer, they decided to approach the Gas Company, to see if they cared to take up electric lighting. Being a local industry with local capital, Mr. Braund explained, they thought the Company should

have the first option. If they could offer as favourable terms as the Electrical Distribution Company, they ought to lose no time in negotiating with the Gas Company. This is certainly a pleasant variation from the usual denunciation by local authorities of the monopoly of gas companies, and their eagerness to welcome a rival illuminant in the electric light.

In addition to the £68,152 already borrowed for electric lighting purposes, the Cheltenham Town Council desire to obtain the sanction of the Local Government Board to a loan of £17,200. Evidence in support of their application was laid before Lieut.-Col. A. E. Smith last Friday; and, as will be seen, it showed that the Council are hopeful that the undertaking will this year earn sufficient to pay the whole of the interest and the amount required for sinking fund. Figures given by the Deputy Mayor (Alderman Norman) revealed that in 1895-6 47,700 units of electricity were sold; the gross receipts being £1050. In the following year the figures were 90,300 units and £2040; in the next, 140,600 units and £3215; and a moderate estimate for the current year gave 204,200 units and £5020 as the receipt. After allowing rebates and for the street arc lighting, he put the receipts for the current year at £6600 net, as compared with £971 net in the first year. The first year's trade result was a deficit of £622; in the following year there was a surplus of £54 on the working expenses to go to the sinking fund; in the next year the surplus was £1262; and he put the figure this year at £3300, which was sufficient to pay the whole of the interest and the amount required for the annual sinking fund. There was no opposition.

A writer in a local paper comments on the evidence given by Mr. R. Hammond at the recent Local Government Board inquiry at Hastings, noticed last week. The witness, it may be remembered, said he could prophesy good results to the Corporation from the purchase of the electric light undertaking; and the writer remarks: "Mr. Hammond made a great point of the success of corporation ventures in many places; but he was bound to admit that in the instances he cited electric lighting had been started under the most auspicious conditions. The corporations, in short, where the greatest success has been achieved have been in the position to take advantage of the accumulated experience and knowledge gained after many years of research, mainly at the expense of the ordinary investor. Very different is the case when a corporation takes over a concern not only possessing much obsolete plant, but so circumstanced as not to have been able to benefit to the extent to which more prosperous companies have benefited by the achievements of electrical science. That the Hastings Corporation will have to incur great expenditure in order to meet the demands made upon them, no one who knows anything about the matter doubts; and after they have spent their money, they will not be in nearly so good a position as they would be if they started upon an entirely new basis. The one thing essential at the present time for this borough is that every enterprise, of whatever character, undertaken, should lessen, as the result of its operations, the demands made upon the ratepayers. Mr. Hammond was very careful to leave out from his evidence all allusions to places where the reverse of this has happened. But he might have given one place close at hand—Brighton, for instance. In 1892—six years ago—Brighton was paying for public lighting by gas a total sum of £9095, and the general district rate was 2s. 10d. in the pound; they are now paying a total of £11,937 for gas and electric lighting, and the rate has risen to 3s. 3d."

Further complaints against the bad arc lighting at Hampstead were made at last Thursday's meeting of the Vestry; and Sir H. Harben, the Chairman, personally brought the Chief Engineer to task for not remedying this scandalous state of things after the exposure at the previous meeting. He suggested that a competent assistant, and not an artisan, should now inspect the lamps and report to the Chief Engineer. This gentleman, in defence, explained that 28 lamps were connected with a dynamo which can only serve 26; and, besides, this engine was not properly "governed," though the makers are daily endeavouring to rectify this, but so far without success. After a few more uncomplimentary remarks from disaffected members, the Vestry considered the Committee's report, which stated:—"(*a*) That they had carefully considered the following reference from the Vestry of Oct. 6, 1898: 'That it be referred to the Lighting Committee to consider and report whether a reserve fund should be formed in connection with the Vestry's electric lighting undertaking.' (*b*) That, under the Hampstead Electric Lighting Order, the Vestry may, if they think fit, provide a reserve fund, by setting aside, out of the profits of the undertaking, such money as they may from time to time think reasonable, and investing and accumulating it at compound interest, until the fund amounts to one-tenth of the aggregate capital expenditure. (*c*) That the reserve fund would be applicable to answer any deficiency at any time happening in the income of the Vestry from the undertaking, or to meet any extraordinary claim or demand. (*d*) That the Vestry have already borrowed for electric lighting purposes the sum of £116,080, and one of the conditions upon which this money has been lent is, that if any portion of the plant, &c., upon which it has been expended requires renewal during the term for which the money was borrowed, the cost thereof must be paid out of revenue. With the exception of £5000, the whole of this money has been borrowed for the term of forty-two years. (*e*) That a large proportion of the plant, &c., provided out of borrowed money will require to be renewed before the expiration of the term for which the money was borrowed." The Committee thereupon recommended that a reserve fund should be formed; and that it should be referred to the Finance Committee to consider and report on the matter. To this the Vestry agreed; but there was some dissent expressed to the Committee's further statement that they were "strongly of opinion that the whole of the profits arising from the undertaking should be set aside to form the reserve fund above-mentioned." The Finance Committee's action will be interesting.

METROPOLITAN WATER SUPPLY COMMISSION.

The Commission, which held its last meeting on the 25th of July, resumed its sittings yesterday—Viscount Llandaff presiding. It will be remembered that, when the adjournment took place, Mr. Reginald E. Middleton, who was an Assistant-Commissioner on Lord Balfour's Commission, and is Joint Engineer with Mr. W. H. Hunter to the Staines Reservoirs Committee, was under examination by the Chairman, and that his evidence was not completed. On the Chairman taking his seat, he stated that the President of the Local Government Board had written to the Commission asking them to take evidence regarding the question of inter-communication between the different Companies, and to report upon it as soon as possible. Mr. Pope said that, since the communication from the Commission to the Companies on the point, the latter had met and carefully considered what their position should be with regard thereto. They were prepared to offer general evidence as to the practicability of such a matter; but as it involved so many questions of detail and legal matters, it appeared to them that it would be desirable to save the time of the Commission to direct their evidence to the general question rather than to go in detail with respect to any particular scheme of connection. The Commission were also aware, he believed, that the result of inter-communication between the Companies was that they had come to the conclusion that it would be a convenience to promote a Bill next session obviating these questions of detail; and they would undertake to bring forward such a Bill. He proceeded to call attention to a series of resolutions agreed to by the associated Companies, expressing in general terms their views with regard to such legislation. Briefly, it was that, while a scheme of inter-communication was perfectly practicable, it would be desirable that some authority should be armed with power to say how and in what way connection should be made—not merely when the emergency came, but anticipating the necessity; and the Companies would suggest that the details might be left to the Local Government Board. Further conversation having taken place, Mr. Ernest Collins, Distributing Engineer to the New River Company, was called, and gave evidence regarding means of effecting inter-communication between all the Companies. The proceedings will be reported at greater length next week.

THE LONDON COUNTY COUNCIL AND THE WATER QUESTION.

Financial Considerations—The Water Companies' Undertakings to be Acquired.

By the recommendations concluding the report of the Water Committee of the London County Council (see *ante*, p. 985) which came under discussion last Tuesday, the Council, it will be remembered, were advised to ask Parliament for power to purchase the undertakings of the Metropolitan Water Companies, and to bring an additional supply of water to London from Wales. As these proposals involved capital expenditure in excess of £5000, the Standing Orders of the Council directed the Finance Committee to report upon the financial bearings of the question. They accordingly did so; and their report was dealt with in the article on "Water and Sanitary Affairs" last week. The Committee were, of course, not in a position to make for themselves any estimate of the expenditure involved; but they were assisted by a memorandum prepared for them by the Comptroller (Mr. H. E. Haward), and circulated to the Council. The Committee's report is as follows:—

The subjects of purchase and of additional supply have been discussed at length before Lord Llandaff's Commission and in the reports of expert officers of the Council; and we do not think that fresh investigations on our part would add materially to the information before the Council, or would justify us in asking the Council for further time to make our report. Indeed, the data for framing a trustworthy estimate of the cost of purchase do not exist; and we shall not put forward calculations based upon assumptions for which we have not a warrant. There are, however, figures which represent facts, and upon which, therefore, reliance may be placed. The net income of the Companies, after payment of prior liens, is an ascertained fact; and the Comptroller estimated, in evidence before Lord Llandaff's Commission, that the purchasing authority would in 1901-2 enjoy a net income of £1,030,000. This estimate assumed a progress in gross profits during the five years from 1896-7 corresponding to that which obtained during the preceding seven years. It assumed also that the water-rates would continue to be levied as at present. We think that the Comptroller has proceeded upon a sound financial basis, and that the Council may bear the figure of £1,030,000 in mind when it is considering the proposals of the Water Committee. Lord Llandaff asked what was the amount of capital, the interest and sinking fund on which could be met by a net income of £1,030,000. This also is a matter of simple calculation dependent on rate of interest and term of redemption. By these data the Council may measure, to some extent, the financial result which may follow from purchase.

The question of additional supply raises a different financial issue. It is admitted that, under any circumstances, the safety of London requires a large outlay in order to secure a supply which within a comparatively short time will be a necessity. The outlay involved will earn no immediate income; and it must be incurred either in providing storage in the Thames Valley or in bringing water from a new source. It is not, therefore, a question whether fresh outlay can be avoided. On this point all parties are agreed. It is a question which of two costly schemes will best attain the end in view. The storage scheme may cost a sum not very much less than that of bringing water from Wales. Even if the outlay on storage were considerably less than on the Welsh supply, it must be borne in mind that before long the Thames may not suffice for the wants of Greater London. In that event, a new supply must be sought, and a scheme less costly at the outset may cost more in the end.

One important point remains for consideration—the term within which the water debt should be redeemed. Parliament does not permit the term of redemption for Metropolitan loans to exceed 60 years; and in the case of ordinary loan services the limit is reasonable, for the ratepayers of the future will have their own pressing needs, and the charge of a sinking fund spread over 60 years is not excessive in the case of ordinary improvements and ordinary works. The purchase of the Water Companies' interests is, however, an acquisition made once and for ever; and if, in addition, the present ratepayer undertakes a charge for which he gets no immediate return, in order to secure a lasting supply of water for future generations of ratepayers—if, in fact, he insures his successors against the calamity of water famine—the burden should at all events be made as light as possible. We have therefore no hesitation in recommending that the period of redemption, both for purchase and additional supply, should be fixed at 100 years.

At the Meeting of the London County Council on Tuesday last—Mr. T. M'Kinnon Wood in the chair—the Water Committee's report was presented.

Mr. W. H. Dickinson, in moving the reception of the report, said the Council were called together to deal with perhaps the greatest and most momentous proposals that had ever been discussed by any municipal body in the history of municipal government. Apart from the magnitude of the figures involved, he thought the proposals had a peculiar importance owing to the position of affairs in regard to the present Royal Commission on Water Supply. He could not help feeling that it required a very strong case to justify the Council in taking action on this question when the Commission were sitting to consider the matter. The Water Committee had fully realized this difficulty, and as long ago as last May they came to the conclusion that they would not put forward proposals, but await the course of events in the summer. Events had proved to the satisfaction of the Committee that any further delay would be a serious matter for London. There had already been enough delay. He thought he was right in saying that the House of Commons on two occasions had been grievously misled by Her Majesty's Government on this subject; and he could not help thinking that the members of the House of Commons themselves, now that the facts were proved, would recognize that they could not afford to go on delaying the matter because a member of the Government chose to take his information from paid Directors of the Water Companies.

Mr. Beachcroft, rising to order, asked whether this was a proper allegation to make in an assembly of that character.

Mr. Burns, M.P.: And the Thames Conservancy.

Mr. Dickinson (continuing his remarks amid expressions of disapproval from the Moderates and cheers from the Progressives) said the Government had rejected the advice of those who were honestly and honourably serving London, and not their own private interests. Parliament would now look upon the matter from a different point of view. They had now evidence that Mr. Chaplin had misled—he did not say intentionally—Parliament when he said last year that there was no chance of the recurrence of another water famine. It was not merely a question of the East London Water Company. The Lambeth Company had been drawing more than their statutory quantity of water from the Thames; the West Middlesex Company admitted that they required further powers in order to give an efficient supply; and the resources of the Southwark and Vauxhall Company were rapidly coming to an end. One of the reasons why delay was so serious was that it had been proved to demonstration that the Balfour Commission had broken down. This was a serious allegation to make; but it was borne out by every man—he believed even by Directors of the Water Companies—who had taken the trouble to investigate the matter. The fact was that by the middle of next century they would be requiring nearer 600 than the 400 million gallons of water which the Balfour Commission said would be required daily. He traversed many of the statements of the Water Companies as to the supply of water from the local sources, those of the River Lea being totally inadequate. Had the East London Company depended upon the Lea alone, no amount of expenditure upon new works would have prevented a water famine. The supply from the Lea was short by 2000 million gallons in the quarter; and if the Company had had reservoirs as large as the ocean, they could not have obtained water from the Lea to fill them. This was the position in regard to the Lea; and that of the Thames was equally dangerous and urgent. The Council had to consider the interests of between 11 and 12 million persons living on the banks of the Thames, and they were responsible for the port of the Thames. If in another thirty or forty years' time it was found that the Thames was nothing but a pond, only oscillating backwards and forwards silt and filth instead of the river that ought to run down to the sea, he ventured to think that the responsibility of the Parliament who had caused this solely in the interest of private undertakings would be a very grave one. It had recently been said that the Nile was Egypt and Egypt was the Nile. Equally could it be said that the Thames was London and London was the Thames; and he protested against Parliament allowing private Companies to destroy the natural feature which created and maintained London. All the statements of the Council's Engineer had been corroborated by facts. For years he stood alone in the position he took with reference to the capabilities of the Thames and the Lea to meet the wants of London; and nothing could be more conclusive of his foresight and ability than the facts now in the possession of the Council. It was proved that he was right and everybody else was wrong. The Council had seriously to consider what would be the position of the Thames and Lea in the next ten years, and whence they could get a supplementary supply of water. They had 290 million gallons a day, and they would want another 120 millions in the next fifteen years. There were only two possible sources—the Thames and Wales. They could get it all from the Thames if they cared to risk the terrible consequences he had mentioned. One of the chief matters of consideration was the cost of getting this extra 120 million gallons. Having regard to the serious position of affairs, he did not believe Parliament would say that the Council must go back again, and he ventured to appeal to Lord Onslow, who had placed an amendment on the paper, to think twice before he committed himself to the policy of delay. They might find the Government, a little later on, insisting on the Council withdrawing their Bill; but until that moment arrived, he thought it would be a serious matter for any party, or a portion of any party, connected with London government to admit that there might safely be one or two years' delay in this matter. The present proposals of the Committee, put shortly, were to purchase the undertakings of the eight Water Companies. They put this forward because they held it to be the only method by which they could really safeguard London from a future water famine. It was not a question of forcing one Company to supply another in a moment of emergency, but of whether they should at all times of the year have the whole body of water available for the Metropolis in the hands of one authority who would be able to use it as they pleased. This was the problem; and the only way in which they could solve it was by buying up the water-works. They offered the Companies a fair and reasonable value for their undertakings. Those words "fair and reasonable" had twice been rejected by the House of Commons; but he doubted whether they would continue always to reject them. All the Committee meant by the words was that the price should not be unfair or unreasonable. They wanted the undertakings sold at such a price that, when the money was paid, they would be able to reap a reasonable profit, in the same way as the Companies, from the income. The Committee were prepared to say that if Parliament, in its wisdom, after the report of the Royal Commission, thought that the water supply ought not to be in the hands of the Council, but in those of some other authority, they would accept it as the decision of a higher authority.

Mr. Whitmore, M.P., thought the prime object all ought to have at heart at that moment should be to try and approximate their views as closely as possible. He recognized that the events of the past summer and autumn made it clear that for any part of London to depend for its water supply on any one Company was a bad system which must be remedied as soon as possible. He thought, therefore, that the Committee's third recommendation (as to the connecting of mains) ought to receive the unanimous support of the Council; and if a separate Bill to this effect were brought before Parliament, it would doubtless pass the second reading in the House of Commons. London must certainly have a new source of supply; but he would not commit himself to the scheme of the Committee. A Bill to effect this purpose would, he thought, pass its second reading; but he could not vote for the second reading of such a Bill if he thought he was in any way implicating himself with the idea that the Council would necessarily be the future owner and controller of that supply. With regard to the proposal for the purchase of the Companies' undertakings, he had always said that they could not safely, in the financial interests of London, buy them up; and before they asked Parliament to sanction such a scheme, they ought to show that it could be made a profitable transaction. Here they came to the embers of the old controversy. Then there was a Royal Commission sitting, charged with the duty of inquiring into this very question; and no legislative assembly would, he thought, dream of giving its sanction to such proposals as those of the Committee until that Commission had reported. He therefore disagreed absolutely with the recommendation to introduce the question of purchase until the Royal Commission had reported.

The report was then formally received; and the recommendations were considered *seriatim*. To the first—"That a Bill be promoted in the coming session of Parliament for the purchase by the Council of the undertakings of the eight Metropolitan Water Companies by agreement, or, failing agreement, by compulsion,"

Lord Onslow moved, as an amendment—"That the recommendation be referred back to the Committee, inasmuch as Parliament cannot be expected to deal with the whole question of the London Water Supply pending a report of the Royal Commission which has been appointed to consider the subject, and only useless expense will be incurred by the promotion of any Bill framed without due consideration of the recommendations of that Commission; but that, as it is a matter of great urgency that provision should be made at the earliest possible moment against a recurrence of the scarcity of water in one part of London, while in the other parts there is more than a sufficiency, the Council do promote a Bill providing that any Metropolitan Water Company be required, in case of emergency, to supply water to any other such Company whose supply may be deficient, and providing for the connection of the reservoirs and mains of the several Companies for facilitating arrangements for this purpose. That, in view of the urgency of the matter, application be made to Parliament for the suspension, if necessary, of Standing Orders, so as to admit of the introduction of the Bill, as was done in the case of the Southwark and Vauxhall Water Company's Bill of 1897. That, therefore, the preparation of a Bill for the purchase of the Water Companies' undertakings be deferred until it can be seen how far the Council can harmonize its policy with the views of the Royal Commission; and that it be an instruction to the Committee to take that report into consideration as soon as issued, and advise the Council, without delay, what steps should then be taken to deal with the supply of water to London."

The Chairman ruled that the words from "but that," after the word "Commission," down to "Bill of 1897," were out of order.

Lord Onslow, speaking in support of his amendment, took exception to the remarks of Mr. Dickinson, in which he had charged the President of the Local Government Board with having taken the advice of the paid Directors of the Water Companies in dealing with the water question. The fact was that whenever Mr. Chaplin had occasion to take advice on this subject he consulted different independent and expert gentlemen on the permanent staff of the Board. With reference to the third clause of the Committee's recommendations, he desired to fully associate himself with the attitude taken up by Mr. Whitmore. He did not, however, believe that it was possible to settle this question except by the purchase of the Water Companies' undertakings by a public authority. But they must consider the circumstances in which they were now placed; and until the Royal Commission reported he did not believe Parliament was likely to look at the measures the Committee were proposing to place before it. There was nothing new in the report which had been presented. It was the same old policy—going back, indeed, to 1895—and was less in accordance with the expressed views of Parliament than more recent proposals. There was no evidence in the report that the Committee had endeavoured in any way to meet the views of Parliament with the object of settling a question which all were agreed had been too long delayed. It was chiefly round the arbitration clauses that the controversy had raged; and yet the same conditions, already rejected by Parliament, were to be retained. He pointed out that the Comptroller of the Council purposely avoided going into financial matters because the Royal Commission were considering these questions. He (Lord Onslow) did not believe the Committee had seriously considered the effect of the purchase on the rates of London. They could not expect that the water-rate would remain the same. The time had come when all parties would co-operate in framing a measure which would be likely to meet the approval of Parliament; and he would be glad to give his services to the Committee in this direction. By his amendment, he was simply asking the Council to defer for one year—because it could not be longer—the presentation of a complete scheme. No one in that room believed that the Royal Commission would not report during the year 1899; and then would be the time for the Council to seriously devote itself to devising a scheme which it was likely Parliament would accept. He believed that nothing but waste of time and money could result from forcing on the proposal in the present circumstances. He advised members to join with him in voting for what was a practical and businesslike policy—to await the report of the Royal Commission, when they could bring in a full and final scheme based upon

independent testimony, and one which would be supported by the unanimous voice of London, to which Parliament would not refuse to listen.

Mr. COHEN, M.P., in seconding the amendment, protested against any more of the ratepayers' money being expended in promoting hopeless Bills. A return showed that the Council had spent £32,000 in promoting and opposing Water Bills, without any benefit to the ratepayers. It was desirable to secure sources of future water supply; but it was ridiculous to expect parliamentary sanction to any scheme until the Commission had reported. Anxious as he was to put an end to the Water Companies and have a Central Water Authority, he would be no party to hasty and abortive proposals.

Mr. BEACHCROFT said he was unable on the present occasion to regard the matter from the same point of view as Lord Onslow. The question was now, not whether the Council would be justified in promoting a Bill for purchase in anticipation of a report from the Royal Commission, but whether there was any justification for waiting another year before asking Parliament to consider the want of London in the matter of supplementary sources of water. The past few months had satisfied him that this was immediately urgent, and that a mere Bill for connecting mains and reservoirs would only tide over matters for a year or two. Not only in the East-end was there scarcity, but the streams of Kent were depleted, and even the springs of Hertford were being drained dry by the New River Company. He did not believe that any storage system would be sufficient. Liverpool, Birmingham, Swansea, and Cardiff had already appropriated areas in Wales; and Leicester, Nottingham, and Derby were now in search of water, and would have Bills before Parliament. If London were not quick, it would be too late, and the blame would fall on those who blocked the way of reasonable application to Parliament. Holding the view that the Council could not promote a Bill for a Welsh supply without at the same time depositing one for the purchase of all the Companies' undertakings, he saw no alternative but for them to bring forward both Bills.

Mr. CORNWALL criticized the policy of Lord Onslow, the general effect of which would, he said, be to play into the hands of the Companies.

The DEPUTY-CHAIRMAN (Mr. H. P. Harris) thought a useful purpose might be served by laying the Committee's proposals before Parliament pending the report of the Royal Commission. Of course, Parliament could not be expected to agree to them without having had that report; and should it be favourable, they would provide useful machinery.

Mr. LAWSON thought the Council need not wait for the report of the Commission. If they asked Parliament to give them a supplementary supply, they must be prepared to take over the whole responsibility.

Sir A. ARNOLD appealed to Lord Onslow to withdraw his amendment. He said that the Royal Commission were bound to report in time for legislation next session; if they did not, it would be a grave scandal. Meanwhile, no excuse should be offered them for delay. He supported the policy of the Water Committee. He did not believe that their proposals would be opposed in the House of Commons, except, perhaps, in a perfunctory way, if they approached the Water Companies in a fair and liberal spirit. (Mr. BOULNOIS, M.P.: Hear, hear.) He was glad he had the approval of the Chairman of one of the Companies for this statement.

Mr. H. CLARKE said that, as a member of the City Corporation as well as of the Council, he was prepared to support the report of the Committee. He strongly deprecated any further delay in taking parliamentary action. Let them go with a firm front, and let Parliament be responsible for the result.

Dr. COLLINS congratulated the Council on the unanimity shown in the debate, and contended that no procrastinating Royal Commission should be an excuse for the Council not going forward with the recommendations of their Committee.

The Earl of HARDWICKE expressed his inability to support the amendment; and Sir J. BLUNDELL MAPLE, M.P., appealed to Lord Onslow to withdraw it.

Mr. BURNS urged that the time had come when London should have the same measure of justice in the matter of water supply as the big provincial towns.

After some remarks by Mr. ANTROBUS, the discussion was closured.

The Council then divided, when there voted for the amendment, 15; against it, 101—majority, 86. The recommendation was subsequently adopted *nem. con.*, amid loud cheering from the Progressives. The majority was composed of 74 Progressives and 27 Moderates. Mr. Boulnois did not vote.

The second recommendation—"That, subject to such provision as may be made by Parliament as to the ultimate relationship between London and the outside authorities, provision be made for the undertakings of the Companies vesting in the Council at a date not later than six months after the passing of the Act"—was then submitted. An amendment had been moved to delete the words "relationship between London and the outside authorities," and to substitute in their place the words "authority or authorities." This was accepted; and the recommendation as amended was unanimously agreed to.

To the third recommendation—"That the Bill contain provisions authorizing the Council to proceed forthwith with the connecting and laying of mains and other works necessary in order to enable it to protect any part of the Metropolis from want of water"—Mr. BEACHCROFT moved the following amendment: "That, inasmuch as it is certain that no Bill promoted by the Council could become law until the end of the ensuing session, and in view of the urgency of the situation, Her Majesty's Government be asked to bring in a Bill to ensure that, pending the settlement of the water question, whether by means of the Council's Bill for purchase or otherwise, immediate steps will be taken to secure such connections of mains and reservoirs and interchange of water between the several Companies as may be necessary to protect all parts of the Metropolis from actual want of water." After some discussion, however, the amendment was lost by 70 to 28.

Colonel FORD then moved to add the following words: "But, in order to meet the contingency of the proposed Bill not receiving the sanction of the Legislature during the ensuing session of Parliament, it be an instruction to the Committee to also introduce a separate Bill, securing to the Council powers (with the approval of the Local Government Board) to compel an interchange of water supply between the several Companies, if and when the necessity arises, upon such terms and conditions as may be from time to time sanctioned by the Local Government Board; such powers to include authority to the Council to incur all expenditure necessary to secure the connecting and laying of mains and other necessary works."

Mr. BALIAN seconded the proposition; but it was not carried.

The recommendation was then agreed to, as were the remaining five; the one dealing with the subject of bringing a supply of water from Wales being carried unanimously.

The debate, which had occupied practically the whole of the sitting, then closed.

THE PROJECTED WELSH WATER SUPPLY SCHEME FOR LONDON.

The Report of Sir B. Baker and Mr. G. F. Deacon.

(*Continued from p.* 988.)

Dealing with the second point—the influence of the project upon the flow of the Thames—the Engineers say:

In an ordinary scheme of water supply, the source of which is a pure mountain stream, the high floods, which may well be spared, are available for storage and use. By impounding such streams, the dry-weather flow is not reduced, but on the contrary is, in all important cases, greatly increased, in virtue of the compensation water which the Special Act requires to be given. By the conditions of the Staines project as laid before the Royal Commission, the whole of the water for storage must be taken from the river when the flow exceeds 200 million gallons, and does not exceed 2300 million gallons a day, unless the latter volume has continued for more than fifteen days. This condition makes it necessary to draw the river down to the 200 million gallon level at Teddington for long periods at a time. During the last fourteen years, the natural average weekly flow of the river has on no occasion fallen below 273 million gallons a day. This minimum occurred in 1896. After deducting the water taken by the Companies, the weekly average of the discharge at Teddington has only fallen to 200 millions a day in six out of the last fourteen years; and the average period during which it has remained so low during the fourteen years has only been seven days a year.

The Royal Commission do not specifically approve the proposal to permit the river to be pumped down to 200 millions for longer periods than at present. They say (paragraph 182): "We think that regulations could be framed under which the quantity we suggest could be taken not only without reducing the flow of the river on the rare occasions of exceptional drought to the present minimum, but in such a way as to secure that the volume of water left in the river at these times would be substantially greater than it is under existing conditions." Here there is no reference to the effect of the project upon the duration of the minimum. *Cæteris paribus*, any increase of the volume of the minimum flow, however short the period, is some improvement; but the words "substantially greater than it is under existing conditions" can scarcely have referred to the mere bringing up of the extreme minimum to what, notwithstanding the existing pumping, is now the minimum, except on an average of seven days in a year, especially if during the remaining days of summer and autumn the flow were to be reduced to that minimum. But such is the effect of the project.

Reverting to the conditions which would have obtained in 1893 if the project had been in operation, we find that the principal changes in the flow of the river would have been as follows: Whereas the weekly natural flow of the river at Teddington never during that year fell below 281 million gallons, and after the deduction for pumping by the Companies only fell to 200 millions on 28 days, the project for the supply of 200 millions to London would have brought that flow down to the 200 million limit on 153 days, while that for the supply of 300 millions would have done so on 185 days, and that for 400 millions on 223 days.

	Percentage of Natural Flow.	Duration of Reduced Flow.
As matters stood in 1893, the flow fell, in consequence of pumping by the Companies, to or below 200 millions, or about	62 per cent.	during 28 days.
If the 200-million scheme had been in operation, the flow would have fallen to 200 millions, or about	53 "	" 153 "
If the 300-million scheme had been in operation, the flow would have fallen to 200 millions, or about	50 "	" 185 "
If the 400-million scheme had been in operation, the flow would have fallen to 200 millions, or about	45 "	" 223 "

It is not only in the dry years that serious changes would occur. There have been several years of approximately average rainfall on the Thames basin since 1883, when the records of gauging at Teddington were begun. The first of these (1885) was more than 2 per cent. above the average; but the effect upon the river would have been as follows:—

	Percentage of Natural Flow.	Duration of Reduced Flow.
As matters stood in 1885, the flow fell, in consequence of pumping by the Companies, to or below 200 millions, or about	65 per cent.,	during 10 days.
If the 200-million scheme had been in operation, the flow would have fallen to 200 millions, or about	52 "	" 95 "
If the 300-million scheme had been in operation, the flow would have fallen to 200 millions, or about	47 "	" 127 "
If the 400-million scheme had been in operation, the flow would have fallen to 200 millions, or about	46 "	" 134 "

The effect upon the river between the new intakes (situated probably

above Bell Weir) and Teddington Weir—a length of 18 miles—requires consideration. In this length the water from about 26 per cent. of the whole area of the Thames basin down to Teddington is discharged into the river; and it was stated in evidence by the promoters of the Staines Reservoirs Bill, 1896, that the natural flow over Bell Weir was about 71½ per cent. of the natural flow over Teddington Weir. Assuming this to be correct, 200 million gallons at Teddington Weir would, in the absence of pumping between the two weirs, be equivalent to 143 million gallons at Bell Weir. But the conditions of the project, as laid before the Royal Commission, imposed no obligation upon the promoters with respect to the quantity passing over Bell Weir; and it would often happen that Bell Weir would be pumped down much below 143 million gallons, while the 200 millions was maintained at Teddington, by streams discharging into the Thames at intermediate places. For example, with the 300 million gallons scheme in operation, the average daily flow at Bell Weir during 167 days in 1893 would have been about 88 million gallons, and during some weeks it would have been still less. The reaches most affected would be those between Bell Weir and Penton Hook, and between Penton and Chertsey. If the condition were imposed that the river at Bell Weir should not be drawn below 143 million gallons, the reservoirs would have to be considerably enlarged. The exact effect of these considerations depends upon the position of the intakes; but wherever they are placed above Staines, the principle will be the same.

It has already been stated that during the last fourteen years the natural average weekly flow of the river has on no occasion fallen below 273 million gallons a day; and that, after deducting the water taken by the Companies, the weekly average of the discharge at Teddington has only fallen to 200 million gallons a day in six out of the last fourteen years. If the scheme for the supply of 200 millions to London had been in operation, the 200 million minimum at Teddington would have been reached (for periods exceeding a week at a time) in eleven out of the fourteen years; while by the 300-million scheme the river would have been similarly drawn down in all years.

The direct effect of this abstraction by reason of the extent to which it reduces the level of the water in the tidal portion of the river may not be of much importance; but the reduction produced in the velocity and scouring action of the ebb tide (caused by prolonging the dry weather flow in the manner involved in the Staines project) would, in our judgment, have a detrimental effect upon navigation and upon the sanitary condition of the river. Were large additional volumes of water abstracted from the Thames, extra expenditure would have to be incurred in dredging local deposits; and having regard to the fact that the abstraction of fresh water will, in an exactly proportionate degree, be accompanied by a corresponding increase in the volume of sewage effluent poured into the river at Barking and Crossness, it might be found necessary or desirable to discharge the additional sewage at some point lower down the river than the present outfalls.

It is proper to draw attention to the fact that since the finding of the Royal Commission an instalment of the Staines scheme has received the sanction of Parliament—by the Staines Reservoirs, &c., Act, 1896—but without the safeguards which the Commission recommended. The Act as it stands provides that the main reservoirs shall be kept full to the greatest capacity so far as practicable; but no condition is imposed to prevent the water from being supplied to such reservoirs, or direct to the town, in any state of the river except when it is flowing at less than 265 million gallons a day at Bell Weir, which is fixed as the equivalent of 200 millions at Teddington, some 18 miles lower down, after allowing for the abstraction of 130 million gallons a day which the existing Companies have power to pump from the river between the two places.

In laying the Staines scheme before the Royal Commission, even the original projectors provided that no water should be drawn direct from the Thames during the first 15 days of a flood exceeding the rate of 2300 million gallons a day at Teddington; but the Staines Reservoirs Act, 1896, contains no such condition, or any other provision in lieu of it. Moreover, the Act contains no limitation (except that set up by the limit of quantity to London) to the period during which the river may be pumped to its minimum; and the Companies even by this small instalment of the project, providing only 35 million gallons a day for London, may increase the present maximum duration of the flow of 265 million gallons at Bell Weir from about 59 days to 105 days, or, with the permission of the Local Government Board, they may take 45 million gallons a day, and thus increase the period of minimum flow to 117 days.

There is no doubt a serious difficulty in dealing piecemeal with the subject of storage reservoirs either on the Thames or the Lea; and we think that any provision for the better storage of the supplies which the Companies at present have power to derive from the Thames and Lea should be common to all the Companies pumping from either of these rivers respectively.

(To be continued.)

THE TYNEMOUTH CORPORATION AND THE NORTH SHIELDS WATER COMPANY.

The Recent Arbitration Proceedings.

At a Special Meeting of the Tynemouth Corporation on Monday last week, the Town Clerk submitted a report of a Consultative Committee on the recent arbitration proceedings, and also the proposed terms of settlement. After fully detailing the arrangement come to with Earl Percy respecting his rights, the document stated that the Corporation were to pay to the Company, on behalf of themselves and Earl Percy, the sum of £75,000; and thereupon to succeed to all the property (including money in hand, reserve fund, plant, stock-in-trade, &c.), rights, and liabilities of the Company, in all respects other than their liabilities to the debenture holders. The costs of the Company and Earl Percy in the arbitration are to be paid by the Corporation, who were to immediately take possession of the undertaking, and pay the Company 5 per cent. on the £75,000 until it was paid. Alderman Elliot moved—"That the proposals made by Counsel for the North Shields Water Company, as contained in the terms of arrangement, dated Oct. 19, as to the price to be paid by the Corporation to the Company and Earl Percy for the purchase of the undertaking, and the settlement of other matters, set forth in the terms of arrangement, for the sum of £75,000, be adopted and confirmed." Alderman Armstrong seconded the motion, and said he believed that neither Earl Percy nor the shareholders had any reason to complain at the price they were getting for what they had to sell. The borough was now the water authority for practically the whole of East Northumberland, and would be enabled to supply all the district between Shields and Blyth in the near future. If this was not realized, it would be the fault of the ratepayers themselves. The motion was unanimously adopted.

PROGRESS OF THE NIDD WATER SCHEME OF THE BRADFORD CORPORATION.

The report of the Water Committee of the Bradford Corporation for the municipal year just ended contains the following account of the progress of the Nidd water undertaking: Concerning the Gouthwaite reservoir, the building of the masonry wall, the gauge basin, river retaining walls, and river channel works are all completed. The whole of the arches, fourteen in number, over the dam, for carrying the roadway, as well as the parapet walls on each side, are finished. A new road along the western side of the reservoir, to replace the existing public road, has been pushed forward during the year; and two bridges carrying the road over Colthouse Beck and Burn Gill are practically completed. The work on the Nidd aqueduct has progressed fairly well; and but for the flooding by water of the middle section of the Greenhow tunnel on Dec. 11, 1897, which prevented two of the faces being worked for a period of some months, the work would have been further advanced. The masonry dam on the Nidd which is being constructed to intercept the water of the Nidd for the supply of the city is about one-third completed. The pipes, valves, &c., therefrom, which join up to the Rain Stang tunnel, are laid; the Rain Stang tunnel, 2486 yards in length, has been driven for a length of 2360 yards; and the main aqueduct, consisting of 36-inch pipes and cut-and-cover work, together with the branch aqueducts connected therewith, are completed to Burn tunnel. The Burn tunnel, 1844 yards in length, is finished. The pipes, aqueduct, bridges, &c., from Burn tunnel to Greenhow tunnel are all completed. The Greenhow tunnel has been driven to a length of 4850 yards, out of a total of 6200 yards. From thence to Chellow Heights reservoir and filter-beds the main-line aqueduct, pipes, valves, manways, bridges, &c., are practically completed. The 30-inch pipe-line from the main aqueduct to Barden reservoir is two-thirds finished; and the intercepting dam on the Barden Beck is in progress. The whole of the pipes for the Nidd aqueduct have, with the exception of a few special ones, been supplied. The work connected with the Chellow Heights service reservoir and filter-beds has been pushed steadily forward. The walling encircling the reservoir is nearly finished and coped, the bottom of the reservoir for about one-third of its area has been puddled with 14-inch clay puddle, and on the top of this a layer of concrete has been laid 14 inches thick. The masonry of the upstand outlet and superstructure is complete; and other parts of the work have been finished to the following extent: 75 per cent. of the walling, concreting, and puddling of the reservoir; 28 per cent. of the work in the formation of the filter-beds, including walling, concreting, and puddling; 52 per cent. of the outlet-valve wells of the filters; 9 per cent. of the distributing canal; 79 per cent. of the sand-trap; and 73 per cent. of the pipe-trenches. In all 57·6 per cent. of the work is complete.

Todmorden Water-Works.—At the last meeting of the Todmorden Town Council, it was resolved to appoint Mr. G. F. Deacon Engineer for the new water-works to be constructed at Gorpley. The depth of the reservoir is to be 60 feet; and the retaining walls are to be sufficient in strength to allow for a future increase of 20 feet.

The Horsforth District Council and the Water-Works.—The Horsforth District Council had quite an exciting discussion yesterday week over the contemplated purchase of the local water-works. The Company are proposing to apply for parliamentary powers in the coming session, and to secure authority to carry out some new works. In the course of the debate, it was predicted that all kinds of disastrous things would ensue if the Company obtained the proposed powers. It was considered that the only way out of the difficulty was for the Council to obtain compulsory powers to purchase the works; and they decided accordingly.

Wages and Hours of Labour of Leeds Gas Workers.—An interview has recently taken place between the Chairman of the Leeds Gas Committee (Mr. J. Lowden) and the Deputy-Chairman (Alderman Matthew Walker) and Mr. W. Wood, one of the officials of the Gas Workers and General Labourers' Union, relative to the application of some of the men employed at the gas-works for an increase of wages and a reduction of hours. It was arranged that a special meeting of the new Gas Committee should be called about the middle of November to consider the matter. The application, it may be remarked, first came before the Committee on Oct. 20; but in view of the approaching end of the municipal year, it was the opinion of the members that the best course would be to defer the consideration of the question till after the elections.

Uttoxeter Water Supply.—A special meeting of the Uttoxeter Urban District Council was recently held, under the presidency of Mr. A. C. Bunting, to receive the report of the Committee on the water question. The Clerk read the report, in which it was stated that it had been agreed to purchase the spring at Quickshill—on the estate of Lord Edmund Talbot. The Chairman reminded the Council that they had been casting about for some means of augmenting the supply, and had made inspections and testings at Withington, Carry Coppice, and other places, and had also tried boring at Bramshall. They found an excellent spring at Cresswell and another at Quickshill, and had decided in favour of the latter, which had a daily yield of about 260,000 gallons. There were some engineering difficulties in connection with this spring, and a perpetual obligation to supply free 6000 gallons per day to local farms and cottages, with a right for them to take 4000 gallons more if wanted at 6d. per 1000 gallons. They would have to make a reservoir at Prestwood, and then lay five or six miles of pipes to bring the water to the town. It was estimated the cost would be about £6000. The report was adopted.

NOTES FROM SCOTLAND.

From Our Own Correspondent.

Saturday.

The great scheme for the erection of new gas-works for the Glasgow Corporation was triumphantly carried in the Town Council last Monday. There really was no opposition to it, except the sentimental one, by no means uncommon, of desiring not to have a somewhat objectionable neighbour set down beside you. A gas-works is not a nuisance, if properly conducted; yet there are few who would care to live in the immediate vicinity of a large one. It has not yet been discovered how to make a gasholder, any more than ironwork generally—see Mr. John Ruskin—a work of art; and consequently both sight and smell are offended. But a gas-works is a necessity; and so long as that is so, it must be planted in somebody's neighbourhood. The question of locality is therefore, after that of convenience is disposed of, what amount of resistance is likely to be met with. That there will be objection is almost a certainty; and the problem is how to prevent, allay, or defeat it. In their handling of the subject, the Gas Committee of Glasgow have shown the highest engineering skill. The prevention of resistance was very adroitly accomplished by the short time which there was given for objectors to move; and equally as much by the withholding of the names of other sites which had been looked at. Both these objections were stated on Monday; and they were really the only points upon which complaint could be made. Were the Committee blameworthy for their method of promoting the proposal? I am persuaded, looking to all the circumstances, that they were not. I could cite experience in both ways; and it would all point to the conclusion that large purchases of property for public purposes should be left in the hands of as few persons as possible, and that when a decision has been come to, it should be hurried through. When the public are consulted, there are usually too many advisers; and the suspicion is strong that the advice is not always of a disinterested order. The Blochairn site was selected after the fullest consideration by a Sub-Committee, aided by some competent experts; and when the Gas Committee as a whole were consulted, no one could name a better one. It was the same in the Town Council. Those who did not approve of the Blochairn site did not point to one which would be better. The fact is that they could not. There is scarcely another 100 acres to the east of Glasgow, for many miles, in which there are not underground workings; and to have gone to the west would have meant a higher price for the land, as well as involving heavier charges for the carriage of coal. The elevation of Blochairn was another ground of objection; but it is less than 200 feet above sea-level, and about only some 100 feet higher than the works at Dawsholm. Broomielaw Bridge is, of course, at sea-level; and to send gas there will present no difficulty. To take the case of Edinburgh, gas from the works in New Street rises to the level of George Street, where it intersects Hanover Street—a height of fully 100 feet; and then it goes down to the storage station 'at Canonmills—a descent of, I should say, over 200 feet. I never heard of any difficulty in the distribution of gas there. The point of the amenity of the district, which was the weakest in the hands of the objectors, was the one they made most of. It was absurd to say that the neighbourhood of gas-works is detrimental to vegetation. As to the people moving away from gas-works, because of effluvia emanating from them, the case of Edinburgh may again be cited. There the Gas Commissioners, at their last meeting, affirmed an agreement with Mr. Reginald Macleod, C.B., the Queen's Remembrancer for Scotland—that is, the gentleman at the head of the Exchequer Department—under which he has agreed to remain tenant of Granton House, adjoining the site of the new gas-works, and to pay the former rent. On all points the Glasgow opposition collapsed; and there is satisfaction in knowing that, provided a reasonable price be agreed upon, the best possible site has been secured.

The Oil-Gas Enrichment Company, who are the owners of the Peebles oil-gas patents, have held their fifth annual meeting. The times are against the Company, on account of the low price of cannel and the high price of oil. They also suffered last year from the misfortune that the engineers' strike prevented the alterations which it was found desirable to make upon the new plant in the Paisley Gas-Works from being completed; and no revenue is as yet derivable from that source. The plant will be at work soon, however; and it will effect a great improvement upon the finances of the Company, besides being, there is no reason to doubt, the pioneer of a long series of works in which the process will come to be adopted.

In Glasgow, unfortunately, there are more cases of gas poisoning than in any other town in Scotland. This, of course, is to be attributed primarily to the fact that Glasgow is bigger than any other place; but there is, I presume, another explanation, in the absence to a large extent of stopcocks upon service-pipes. Houses which stand empty for some time, or which become uninhabitable or are converted into stores, thus remain with the full pressure of the gas supply in their pipes. Deterioration by time, or perhaps accident, sooner or later leads to a fractured pipe; the apartment gets filled with gas; and then it penetrates the often slender dividing walls, and the residents in the adjoining house suffer. An incident almost of this sort occurred in the south side of Glasgow on Tuesday. In this instance the disused building was absent; but in the house in which the escape took place no gas is used. The house above it is, however, lighted by gas; and a service-pipe is led to it. The inhabitants of the house, it is believed, were in the habit of attaching a cord to the gas-pipe, upon which to hang clothes to dry; and the supposition is that the weight of the clothes broke the pipe. A man, his wife, and daughter occupied the house. Groans were heard proceeding from the apartment early on Tuesday morning; but as the man was ill, they were attributed to him, and no notice was taken of the matter. At seven o'clock in the morning, the sound was repeated; and there being a smell of gas, a plumber was sent for, who, on entering, found the wife and daughter lying on the floor, and the man in bed, all in an almost unconscious condition. They were treated at the Victoria Infirmary, and happily all recovered.

In virtue of the power granted to the Water Committee of the Glasgow Corporation a few weeks ago to accept the tender of Messrs. Maclaren and Co. for water-pipes, owing to the inability of Messrs. Wood and Co.

GAS AND WATER COMPANIES' STOCK AND SHARE LIST.

Referred to on p. 1024.

Issue.	Share.	When Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p. c.	GAS COMPANIES.			£ s. d.
590,000	10	Oct. 13	10½	Alliance & Dublin	10 p. c.	20¼—21¼	−1	4 17 8
100,000	10	"	7½	Do.	7 p. c.	16—17	..	4 8 3
300,000	100	July 1	5	Australian	5 p. c. Db.	105—107	..	4 13 6
200,000	5	May 26	6	Bombay, Ltd.		6¼—7	..	4 5 9
40,000	5	"	6	Do. New, £4 paid		4¾—5	..	4 16 0
380,000	Stk.	Aug. 12	12	Brentford Consolidated		275—280	..	4 5 9
240,000	"	"	9	Do. New		210—215	..	4 3 9
50,000	"	"	5	Do. 5 p. c. Prf.		140—145	..	3 9 0
159,375	"	June 10	4	Do. 4 p. c. Db. Stk.		130—135	..	2 19 3
220,000	Stk.	Sept. 15	11½	Brighton & Hove,	Orig.	263—268	..	4 5 10
226,320	"	"	8½	Do.	A. Ord. Stk.	190—195	..	4 7 2
933,500	Stk.	Aug. 31	5	Bristol, 5 p. c. max.		125—130	..	3 16 11
420,000	20	Sept. 29	10	British		49¼—50¼	−½	3 19 1
50,000	10	Aug. 12	11½	Bromley, Ord.	10 p. c.	25—27	..	4 5 2
75,000	10	"	8½	Do.	7 p. c.	20—22	..	3 17 3
500,000	10	Oct. 13	6	Buenos Ayres (New) Ltd		9½—10	+½	6 0 0
98,122	Stk.	June 29	4	Do.	4 p. c. Db. Stk.	98—100	..	4 0 0
150,000	20	July 14	8½	Cagliari, Ltd.		29—30	..	5 10 0
100,000	10	Sept. 29	7	Cape Town & Dis., Ltd.		14—15	..	4 13 4
50,000	50	Nov. 2	6	Do.	6 p. c. 1st Mort.	57—59*	..	5 1 8
550,000	Stk.	Oct 13	13½	Commercial Old Stock		310—320	..	4 4 5
200,750	"	"	10½	Do.	New do.	247—252	..	4 3 4
200,750	"	June 10	4½	Do.	4½ p. c. Db. do.	148—153	..	2 18 10
800,000	Stk.	June 10	12	Continental Union, Ltd.		207—212	..	5 13 2
200,000	"	"	9	Do.	7 p. c. Prf.	193—198	..	4 10 11
51,600	Stk	Aug. 31	14	Croydon A	10 p. c.	805—810	..	4 10 4
168,400	"	"	11	Do.	B 7 p. c.	255—265	..	4 3 0
555,000	Stk.	Aug. 12	5½	Crystal Palace Ord.	5 p. c.	125—130	..	4 0 9
60,000	"	"	5	Do.	5 p. c. Prf.	140—145	..	3 9 0
486,090	10	July 28	11	European, Ltd.		23—24	..	4 11 8
354,060	10	"	11	Do.	£7 10s. paid	17—18	..	4 11 9
5,922,280	Stk.	Aug. 12	12½	Gaslight & Coke, A, Ord		288—293	..	4 3 6
100,000	"	"	4	Do.	B, 4 p. c. max.	120—125	..	3 4 0
665,000	"	"	10	Do.	C, D, E, 10 p c. Prf.	308—313	..	3 3 11
30,000	"	"	5	Do.	F, 5 p. c. Prf.	152—157	..	3 3 8
60,000	"	"	7½	Do.	G, 7½ p. c. do.	230—240	..	3 2 6
1,300,000	"	"	7	Do.	H, 7 p .c. max.	195—200	..	3 10 0
463,000	"	"	10	Do.	J, 10 p. c. Prf.	308—313	..	3 3 11
476,000	"	"	6	Do.	K, 6 p. c. Prf.	185—190	..	3 3 2
1,061,150	"	June 10	4	Do.	4 p. c. Db. Stk.	131—133	..	3 0 2
294,850	"	"	4½	Do.	4½ p. c. do.	148—153	..	2 18 10
958,000	"	"	6	Do.	6 p. c. do.	195—200	−3	3 0 0
70,000	10	May 12	8	Hongkong & China, Ltd.		14—15	..	5 6 8
3,800,000	Stk.	"	10	Imperial Continental		223—228	..	4 7 9
376,400	100	Aug. 2	4	Do.	4 p. c. Dbs. Red.	98—101	..	3 19 3
473,600	Stk.	Aug. 12	3½	Do.	3½ p. c. Db. Stk.	101—104	..	3 7 4
560,000	100	Oct. 1	5	Met. of Melbourne	5 p. c. Db.	110—112	..	4 9 3
250,000	100	"	4½		4½ p. c. Db.	105—107	..	4 4 1

* Ex div.

Issue.	Share.	When Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p. c.	GAS COMPANIES.			£ s. d.
75,000	5	June 29	6	Malta & Medn., Ltd.		4¾—5¼	..	5 14 3
541,920	20	June 10	5	Monte Video, Ltd.		13½—14½	..	6 18 0
617,946	Stk.	Aug. 31	9¾	Newc'tle & Gatesh'd Con.		230—240	..	4 1 3
252,355	Stk.	Jan. 3	3½	Do.	3½ p. c. Db. Stk.	113—117	..	2 19 10
150,000	5	May 26	8	Oriental, Ltd.		7¼—7¾	..	5 3 3
135,000	5	"	8	Do.	New, £4 10s. pd.	6¼—7	..	5 2 11
15,000	5	"	8	Do.	do. 1879, £1 pd.	1¼—1⅝	..	4 11 5
60,000	5	Sept. 29	7	Ottoman, Ltd.		5—5½	..	6 6 2
500,000	100	June 1	6	People's Gas of Chicago	2nd M. Bd.	103—108	..	5 11 1
848,070	10	Oct. 13	6	River Plate	Ord.	9—9½	..	6 6 4
250,000	Stk.	June 29	4	Do.	4 p. c. Db. Stk.	99—101	..	3 19 3
250,000	10	Sept. 29	10	San Paulo, Ltd.		14½—15½	..	6 9 0
135,000	Stk.	Sept. 15	10	Sheffield A.		243—245	..	4 1 8
209,053	"	"	10	Do.	B.	242—245	..	4 1 8
447,427	"	"	10	Do.	C.	242—245	..	4 1 8
5,600,000	Stk.	Aug. 12	5½	South Metrop., 4 p.c. Ord.		138—142	..	3 15 1
1,460,000	"	July 14	3	Do.	3 p. c. Db. Stk.	102—105	..	2 17 2
60,000	Stk.	Aug. 31	12	Tottenham and Edmonton	A.	280—290	..	4 2 9
60,000	"	"	9		B.	200—210	..	4 5 9
182,380	10	June 10	7	Tuscan, Ltd.		10¾—11¼	..	6 1 9
149,900	10	July 1	5	Do.	5 p. c. Dbs. Red.	100—103	..	4 17 1
				WATER COMPANIES.			
746,164	Stk.	June 29	10½	Chelsea, Ord.		313—318	..	3 6 0
150,000	"	"	5	Do.	5 p. c. Prf.	170—175	..	2 17 2
160,000	"	"	4½	Do.	4½ p. c. Pf. Stk., 1875	148—152	..	2 19 3
175,785	"	Sept. 29	4½	Do.	4½ p. c. Db. Stk.	155—160	..	2 16 8
1,720,560	Stk.	Oct. 13	7	East London, Ord.		212—217	..	3 4 6
654,740	"	June 29	4½	Do.	4½ p. c. Db. Stk.	157—160	..	2 17 2
390,000	"	"	3	Do.	3 p. c. Db. Stk.	103—105	..	2 17 2
700,000	50	June 29	7½	G'd Junct'n, 10 p. c. max.		115—118	..	3 3 7
310,000	Stk.	Sept. 29	4	Do.	4 p. c. Db. Stk.	138—143	−2	2 15 11
708,000	Stk.	Aug. 12	14	Kent		365—370	..	3 15 8
160,000	"	"	7	Do.	New, 7 p. c. max.	212—217	..	3 4 6
1,043,800	100	June 29	10½†	Lambeth, 10 p. c. max.		300—305	..	3 8 10
406,200	100	"	7½	Do.	7½ p. c. max.	278—283	..	3 4 4
350,000	Stk.	Sept. 29	4	Do.	4 p. c. Db. Stk.	138—143	−2	2 15 11
500,000	100	Aug. 12	13½	New River, New Shares		435—440	..	3 1 2
1,000,000	Stk.	July 28	4	Do.	4 p. c. Db. Stk.	138—143	−2	2 15 11
902,300	Stk.	June 29	6	Southw'k & V'xhall, Ord.		165—170	−1	3 10 7
126,500	100	"	6	Do.	do. 7½ p. c. max.	160—165	..	3 12 9
489,200	Stk.	"	5	Do.	do. 5 p. c. Prf.	170—173	..	2 17 10
1,019,585	"	Oct. 13	4	Do.	4 p. c. A Db. Stk.	138—143	−1	2 15 11
1,155,066	Stk.	June 10	10	West Middlesex		295—300	−5	3 6 8
200,000	"	"	4½	Do.	4½ p. c. Db. Stk.	162—165	..	3 14 7
200,000	"	Sept. 15	3	Do.	3 p. c. Db. Stk.	102—105	..	2 17 2

† Next dividend will be at this rate.

of Philadelphia, to whom the contract was originally given, to guarantee delivery, the order has been placed with the Glasgow firm.

A large extension has just been made at the works belonging to the Alloa Gas Commissioners. The Manager's house, which was situated next to the works, was taken down, and in its stead there is now larger storage accommodation for coke and coal, while part of the space has been added to the retort-house; thus allowing the Commissioners to put in an additional bench. A new engine-house has been erected in the centre of the works, and there has been placed in it a double set of condensers and two exhausters, one of Cowan's patent governors, and exhaust and pressure indicators. Various alterations and improvements have been made on the existing buildings, so that the works are up to date in every respect. The cost of the alterations has been about £3000. The work has been carried out according to the plans and specifications of Mr. A. Yuill. When the Commissioners purchased the works in 1878, the price of gas was 4s. 7d. per 1000 cubic feet, with 2s. meter-rent. This year it is 2s. 6d., without meter-hire.

The Arbroath Gas Corporation on Monday resolved to apply for a Provisional Order empowering them to supply electricity within the burgh. Here, as in nearly every other town, the step has not been taken spontaneously, but has been forced upon the Corporation by the fear that, if they did not move, they would be forestalled by a speculative company. As one Councillor expressed it, they want to be in a position to dictate to a company, and not to be dictated to. So half-hearted were the Corporation in the matter, that in the minds of some of the members the doubt arose that the intention was to keep the electric light out; and an amendment to the motion was proposed and seconded. These gentlemen were, however, satisfied with the explanations which were made; and they withdrew their amendment, and allowed the resolution to be adopted unanimously.

The introduction of acetylene gas into small towns is doubtless being watched by gas managers in many places. It is so much of an experiment that I need offer no excuse for referring to an article which appears in the "Dunfermline Journal" of to-day, relating to the supply of acetylene gas in Cowdenbeath. According to the writer, the venture has not been a success. At this early period in the history of acetylene gas supply it would, however, be unfair to assume that discontent among the consumers means failure of the system. There may be details in the manufacture and distribution which can be easily remedied. All that it is necessary to do in the meantime is to exercise caution, and to watch the course of events in the towns where the new gas has been adopted. Most people will, I suspect, be somewhat staggered to learn that the price charged for acetylene gas is £5 per 1000 cubic feet. Unless this figure can be very largely reduced, when the ignorance and blundering of the public in the use of coal gas is taken into account, it is evident that the accounts of consumers using acetylene gas will remain at a sum so high that the spread of the movement will be slow.

The Corporation of Aberdeen are still exercised about the condition of the brick aqueduct which brings the city supply of water from the River Dee. It is stated that the repairs which have been executed upon the aqueduct have had the effect of preventing contaminating material getting into it. The apprehensions of the public have, however, been aroused; and the condition of the aqueduct is not the only question at present under consideration. The quality of the water itself has come to be of equal, if not more, importance. The river is often in flood, when, of course, the intake must be closed; but, worse than this, there are sewage effluents discharged into it from various places higher up the river, which have a polluting effect. In order to get beyond these discharges, it would be necessary to go as far as Braemar with the aqueduct—a distance of about 60 miles from the city, or 40 miles further than the present aqueduct. There is also the proposal that cast-iron pipes should be laid. To do all this would, it is estimated, cost over £600,000. An alternative scheme is proposed, and accepted with some degree of favour. It is to bring in a new supply from the River Avon, a tributary of the River Don. This scheme is estimated to cost about £350,000. The Corporation have entered into an arrangement with Mr. G. Gordon Jenkins, of Aberdeen, to test the condition and flow of the water for a lengthened period, and to report. This will take time; and, in view of this, and of the imperative need for pure water, when the matter came before a meeting of the Town Council last week, a motion was made, in opposition to the proposal to proceed with the Avon scheme, that the present aqueduct should be superseded by a line of cast-iron pipes. The Avon scheme was, however, carried by a majority of 21 votes to 7.

"Colliery Enterprise in Scotland" is the heading which appeared in the newspapers yesterday over an article giving an account of a visit by a party of gentlemen connected with coal exporting to a new pit at Glencraig, near Lochgelly, Fifeshire, which has just been opened by Wilsons and Clyde Coal Company, Limited, of Glasgow. Two shafts have been sunk a distance of 190 fathoms. Four seams of coal have been found—the main, 5 feet thick; the Jersey, 10½ feet; the Lochgelly splint, 8 feet; and the Lochgelly parrot, 4½ feet. The output is at present about 300 tons per day; and it is expected to rise to 1000 tons. Mr. J. Wilson, M.P., the Chairman of the Directors of the Company, stated at a luncheon that in 1870 the whole export of coal from Scotland was not more than 600,000 tons, whereas last year it was 8½ million tons. It had already reached this figure in the present year; and he expected that before its close it would be well up to 10 million tons. Two other speakers, both from Glasgow, made the significant remark that in the West of Scotland the coal supply is waning, and that it is in Fifeshire that there is now the greatest room for development. Gas managers will be interested in knowing where they are to look for their coal supplies in future.

CURRENT SALES OF GAS PRODUCTS.

LIVERPOOL, *Nov.* 5.

Sulphate of Ammonia.—The improved demand, referred to in our last report, has continued throughout the week, and has resulted in advanced prices all round; the closing quotations being £9 16s. 3d. per ton f.o.b. Hull, and £9 18s. 9d. to £10 per ton f.o.b. Liverpool and Leith. The greatest activity has been witnessed in Scotland, where large speculative

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	Cubic Feet Daily.		Cubic Feet Daily.
BLACKBURN	1,250,000	TORONTO (2nd Cont.; Remodelled)	2,000,000
WINDSOR STREET WORKS, BIRMINGHAM	2,000,000	MONTREAL	500,000
SALTLEY WORKS, BIRMINGHAM	2,000,000	BELLEVILLE	250,000
COLCHESTER	300,000	OTTAWA (Second Contract)	250,000
BIRKENHEAD	2,250,000	BRANTFORD (Remodelled)	200,000
SWINDON (New Swindon Gas Co.)	120,000	ST. CATHERINES (Remodelled)	250,000
SALTLEY WORKS, BIRMINGHAM (Second Contract)	2,000,000	KINGSTON, PA.	125,000
WINDSOR STREET WORKS, BIRMINGHAM (Second Contract)	2,000,000	PETERBOROUGH, ONT.	250,000
HALIFAX	1,000,000	WILKESBARRE, PA.	750,000
TORONTO	250,000	ST. CATHERINES (Second Contract)	250,000
OTTAWA	250,000	BUFFALO, N.Y.	2,000,000
LINDSAY (Remodelled)	125,000	WINNIPEG, MAN.	500,000
		COLCHESTER (Second Contract)	300,000
		YORK	750,000
		ROCHESTER	500,000

KINGSTON, ONT., ... 300,000 Cubic Feet.

buying has been done; and improvement has been most marked f.o.b. Leith, where values a fortnight ago were most depressed. Demand at other points has also been good; and all ready parcels have been promptly disposed of. Consumers' ideas have advanced; but they have scarcely kept abreast with the market. In the forward position, there has also been buying at up to £10 per ton f.o.b. Leith, delivery over the spring months; and at the close makers are asking a further advance.

Nitrate of Soda is steady, at 7s. 7½d. per cwt. for good, up to 7s. 9d. per cwt. for refined quality, on spot.

LONDON, *Nov.* 5.

Tar Products.—The slight improvement in the value of benzol created quite a sensation in this market after the long period of depression and receding values. Whether the improvement will be maintained, it is difficult to say. But with business for crude naphtha having been done in Scotland at under 2d. per gallon, surely the "rock bottom" must have been reached; while a sale of English crude has been made at 2⅝d. naked at makers' works. With such prices as these, it is not worth the distiller's while separating it from his other oils, which are of more value. Carbolic acid shows signs of improvement; inquiries from various sources being pressing. No change appears on the surface in respect to anthracene; but it is felt that the time is rapidly approaching when buyers must come in. Naphthalene in its several forms is moving off freely; but prices are unremunerative.

Business of the week may be marked at the following average prices: Tar, 14s. to 19s. Pitch, east coast, 25s.; west coast, 22s.; benzol, 90's, 9d.; 50's, 10d. Toluol, 1s. 1d. Solvent naphtha, 1s. 2d. Heavy naphtha, 1s. 1d. Crude, 30 per cent., naphtha, 3½d. Creosote, 2⅝d. Heavy oil, 45s. Carbolic acid, 60's, 2s. Creosote salts, 30s. Anthracene, "A," 4d.; "B," 3d.

Sulphate of Ammonia.—The slight improvement noted last week continues with a little more force; and business has been done at the following rates: London, £9 13s. 9d.; North East ports, £9 15s. to £9 16s. 3d.; Leith, £9 16s. 3d.; Liverpool, £9 17s. 6d.—less 3½ per cent.

COAL TRADE REPORTS.

From Our Own Correspondents.

Lancashire Coal Trade.—Any change to notice in the coal trade of this district is certainly in the direction of improvement, and generally the outlook is regarded as satisfactory. The only matter which is causing any uneasiness is that the wages question may be again raised with the commencement of the ensuing year. Mr. S. Woods, M.P., the President of the Lancashire Miners' Federation, having plainly intimated that the men are determined to demand a further advance, as soon as the matter can be again brought forward, in January next. It is anticipated that the men will request a further increase of 7½ per cent., which it is not likely the coalowners would be disposed to entertain; and if persisted in, the question would necessarily have to go before a Board of Conciliation, in accordance with the settlement come to between the Federated Coalowners and the Miners' Federation. The better qualities of round coal are in more active request; and not only are pits being kept on full time, but the output is all moving away. The demand, however, is not yet of any pressing character; and stocks remain practically untouched. Prices are without quotable change from last month, but very firm at full last rates. Steam and forge coals continue in brisk request for inland requirements, but the shipping demand is only moderate. Pit prices for inland sales are firm, with, if anything, a hardening tendency. Inferior sorts of steam and forge coal might be bought at 7s. 6d. per ton, but better qualities range from 8s. up to 8s. 6d. For shipment, ordinary steam coal averages 9s. to 9s. 6d. per ton, delivered at the ports on the Mersey. Engine classes of fuel are also in active demand. Some fairly large quantities have been placed at an advance over last year's rates; and generally collieries are holding for a minimum advance of 6d. per ton upon last year's basis. On current business, prices have in many cases been advanced 3d. per ton on October rates. Common sorts of slack remain without much improvement, and might be bought at 3s. 6d. per ton at the pit; but good medium descriptions range from 4s. to 5s., with best slacks quoted in some cases from 5s. 3d. up to 5s. 6d.

Northern Coal Trade.—There is a weaker tone in the Northumbrian coal trade; but that of Durham is stronger. Best Northumbrian steam coals are quoted at 9s. 6d. per ton f.o.b.; and the demand is still sufficient to keep nearly all the collieries fully employed. Second-class steam coals vary from 8s. 9d. to 9s. per ton; and steam smalls, are 5s. 9d. The demand for gas coal is increasing; and there is very great variation in the prices. For occasional cargoes, up to 10s. 6d. per ton f.o.b. is asked. There is little or no change in the price of manufacturing coa's. Gas coke is steady in demand; but the production is now increasing, and stocks must be growing at the inland works.

Scotch Coal Trade.—Trade is being restricted by scarcity of shipping and of railway waggons, which are both attributable to the great storms of the past two weeks. In some instances collieries are standing idle because they cannot get their output taken away. Supplies of all sorts of coal are plentiful; and, under the circumstances, prices do not improve. The quotations are: Main, 8s. per ton f.o.b. Glasgow; ell, 8s. 9d. to 9s.; and splint, 8s. 9d. to 9s. The shipments for the week amounted to 177,408 tons—an increase of 11,313 tons upon the previous week, but a decrease of 12,627 tons on the corresponding week of last year. For the year to date, the total shipments have been 8,196,686 tons—an increase over the same period of last year of 1,436,511 tons.

Deal Corporation Water Supply.—The Water Committee of the Deal Town Council report a very successful half-year's working; their income being sufficient to pay off the first instalment of principal and interest on the loan for the purchase of the water-works, as well as all current expenses. Besides being able to get through the first six months without making any demand upon the Council, the Committee have a balance in hand.

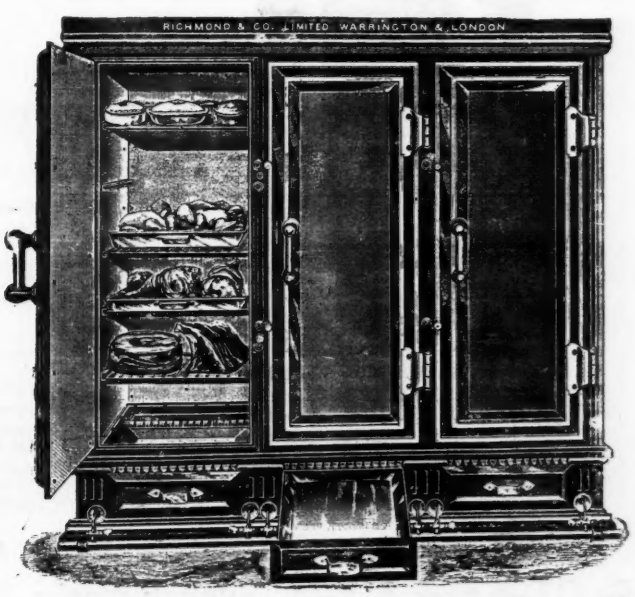
LEADING ARTICLES.

ENGLAND'S

"KITCHENER."

LONDON'S

"MANSION HOUSE."



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The Ramsgate Corporation and the Minster Gas-Works.—The Gas and Water Committee of the Ramsgate Corporation recommend that an application should be made for permission to increase the borrowing powers of the Corporation for water-works purposes to the amount of £20,000, and for gas-works purposes by £30,000, part of the latter to cover the purchase of the Minster Gas-Works.

Warrington Water Supply.—In consequence of the growing demand for water, principally for manufacturing purposes, the Corporation are intending to increase their water-supplying resources. They lately laid certain proposals before Mr. James Mansergh, who advised the construction of a new reservoir in the southern part of the district, and an extension of the works at Winwick. Last Tuesday, the Council directed the Town Clerk to obtain the necessary powers for carrying out the works.

The Supply of Water in the Out-Districts of Southampton.—At the last meeting of the Southampton Corporation for the past municipal year, the Parliamentary Committee presented a report containing a recommendation to the effect that, in view of the information reported to them that it is the intention of the South Hants Water Company to promote a Bill in the ensuing session to obtain further and extended powers, the Corporation should promote a Bill for the purchase of the part of the Company's undertaking supplying the areas added to the municipal borough by the recent extension. The recommendation was adopted.

Slough Gas Company.—The half-yearly meeting of the Slough Gas Company was held last Tuesday. The report showed that the net profit for the six months enabled the Directors to recommend the payment of the usual dividends. They were also pleased to state that the Act of Parliament confirming the Company's Provisional Order had received the Royal Assent, and that the price of gas had been reduced from 4s. 6d. to 4s. 3d. per 1000 cubic feet in Slough, and from 4s. 9d. to 4s. 6d. at Datchet. In proposing the adoption of the report and balance-sheet, the Chairman (Mr. R. Martin) explained that, in order to provide the necessary capital for new works, they had borrowed £2000 from the bank at 3½ per cent., instead of calling up any of the new shares at 7 per cent.; but they hoped to make a further call on the new shares in about two years' time. The report was adopted.

Suggested Municipalization of the Rushden and Higham Ferrers Gas-Works.—The Rushden and Higham Ferrers Gas Company (who have shown much enterprise in meeting a demand which is constantly increasing) are considering the question of promoting a Bill in Parliament during next session, with the view of extending their service. In consequence, several leading public men of both places have come to the conclusion that this is a favourable time to take steps to acquire the undertaking. Last Wednesday a joint meeting of the Higham Ferrers Town Council and the Rushden District Council was accordingly held, when the matter was thoroughly discussed. Eventually the two Councils unanimously decided in favour of the gas supply being in their hands. It was further resolved to at once convene a public meeting in both towns, in order to obtain the consent of the ratepayers to the promotion of a Bill to enable the Authorities to enter into negotiations with the Company.

The Falmouth Gas and Water Works Purchase Question.—In the "Editorial Note" on this subject last week, Mr. Silverthorne's estimate of the cost of the Falmouth Gas-Works to the ratepayers in 1896 was, by a typographical error, given as £53,750 instead of £33,750. His estimate now is £36,450—being an increase of £2700. The subject of the supply of carburetted water gas, which was adversely reported upon by Mr. Silverthorne (*ante*, p. 929), has given rise to some correspondence in the local papers; Mr. J. W. Buckley, the Engineer and Manager of the Falmouth Gas Company strongly contesting some of the alarmist statements which have been made on the subject. We shall notice this matter at greater length next week.

Madeley Water Supply.—At a meeting of the Madeley District Council on October 26, the Water Committee reported that the work at Harrington had been completed, and that the boring and testing had proved successful. Enough water had been found to supply the neighbouring districts. The boring and testing operations had, however, cost £882—£400 more than was estimated; therefore £300 was required to be raised by loan. The Engineer (Mr. Stooke) said they could supply a million gallons every 24 hours; but it was resolved to put down plant for supplying 250,000 gallons every 12 hours. Analysis showed that the water was excellent, and of moderate hardness. The report was adopted; and it was decided to raise the £300 by loan at 3½ per cent.

Church Stretton Rural District Council and the Local Water-Works.—At a meeting of the Church Stretton Rural District Council, last Thursday, a Special Committee appointed to consider the water supply of the area under the jurisdiction of the Council, recommended that valuers be appointed by them and the Church Stretton and Little Stretton Water Companies, for the purpose of fixing a price for the water undertakings, and that, if neither side felt satisfied with the valuers' figures, they should be at liberty to withdraw from the negotiations. The report was adopted. The Church Stretton Company asked £3000 for their undertaking, and the Little Stretton Company £315 when first approached by the Council. The All Stretton Company, who were also requested to state at what price they would be willing to sell their undertaking to the Council, have not yet replied.

Incandescent Gas-Light Litigation in Melbourne.—The Australasian Incandescent Gaslight Company are bringing an action in Melbourne against Messrs. Brandt Bros. for an alleged breach of contract in connection with the Welsbach light. According to the plaintiff Company, they supply the defendants with their mantles on condition that their burners are also used by every purchaser of mantles. This contract, they say, the defendants are breaking. The defendants affirm that the burners they affix to the mantles are the same as those used by the plaintiff Company, and that they have been before the public for fifty years. On the 19th of August, Mr. Justice Hodges was asked to grant an interim injunction restraining the sale or use of the mantles, except in conjunction with the Company's burner. After hearing arguments, his Honour refused to make the order sought, but directed the defendants to keep an account of the mantles and burners used by them up to the trial of the action.

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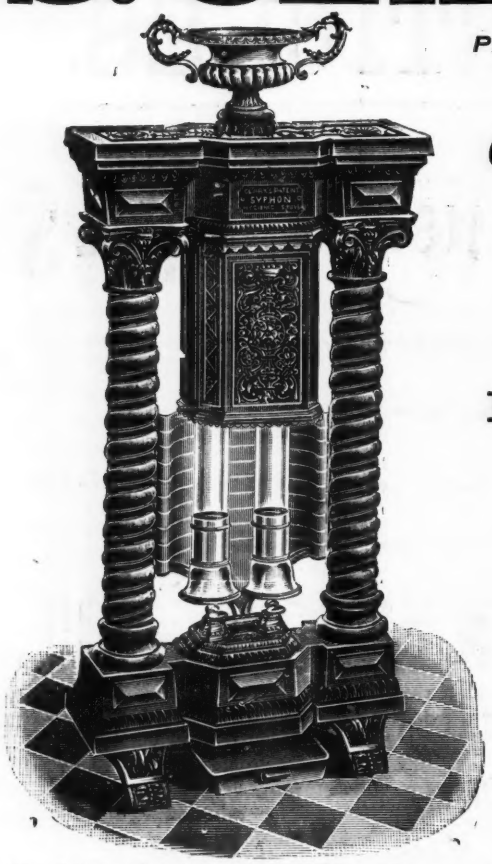

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WRITE FOR NEW SEASON'S CATALOGUE.

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The Derwent Water Scheme.—The Rotherham Corporation on Monday last week decided to join Sheffield in the promotion of a Bill for the acquisition of the waters, or a portion thereof, of the Rivers Derwent and Ashop, subject to detailed terms and conditions embodied in an agreement to be approved by a Sub-Committee.

The Skipton Gas-Works Purchase Question.—The Skipton District Council last Thursday empowered the Clerk to take steps to promote a Bill for the compulsory purchase of the undertaking of the Skipton Gas Company. The Company have rescinded their resolution to apply for a Provisional Order, and have decided to promote a Bill to amend their Act of 1863 and confer further powers.

Sales of Shares.—A few days ago, 400 preference shares in the Budleigh Salterton Gas Company were sold by auction, and realised an average of £5 10s. each; the highest price obtained being £5 17s. 6d., and the lowest £5 5s. Messrs. J. Carter Jonas and Sons offered for sale 255 £10 (7 per cent.) shares in the Cambridge University and Town Gas Company. They were put up in lots of five, which fetched from £85 to £88 10s. On the same occasion, £50 of 10 per cent. consolidated stock of the Cambridge Water Company was sold for £149.

Combination of Tube Makers.—It is reported that negotiations are proceeding for the formation of another combination of tube makers in the West of Scotland. There are now two large Companies there—Stewart and Menzies, Limited, and Wilsons and Union, Limited. A number of the other private concerns have had meetings with a view to reconciling their interests and the formation of a third big Company. Should the negotiations be successful, the trade would be practically in the hands of three powerful combinations, who would have considerable influence on the regulation of prices.

Collapse of the New Mills Water Scheme.—The joint water scheme prepared for a number of parishes, of which Whaley Bridge is the centre, is looked upon by those concerned as having collapsed. The total estimated cost was £26,000; but New Mills withdrew, reducing it one-half. A resolution has now been passed in Committee by the Whaley Bridge District Council, and forwarded to the authorities interested, to the effect that as New Mills has withdrawn from the scheme, and other places have schemes of their own, the Council will take no further action in the formation of a united district for the purposes of water and sewage.

New Joint Stock Companies.—The Sunlight Gas Company, Limited, has been registered with a capital of £60,000, in £1 shares, 45,000 of which have a right to a fixed preferential dividend of 20 per cent. per annum and 15,000 are deferred shares, for the purpose of taking over the premises, business, machinery, plant, and assets of the Sunlight Gas Company, Limited, of Dublin, to adopt certain agreements, and to carry on the business of a gas company in all its branches. The Brentwood Gas, Coke, and Light Company, Limited, with a capital of £35,000, in £5 shares, is to acquire the undertaking of the Brentwood Gas and Coke Company (registered under the Joint-Stock Companies Act, 1856), and to supply gas in the parishes of Brentwood, Southweald, Great Warley, Little Warley, Shenfield, and Hutton, in Essex.

New Water-Works for Morpeth.—Last Thursday week, a new reservoir, filter-beds, and other additions to the Morpeth Corporation Water-Works were opened in the presence of a large number of interested spectators. The Mayor, in declaring the works open, said that, after many unavailing efforts to improve their water supply, the Corporation had at last carried out a scheme, neither elaborate nor costly, which would give to their growing town an abundant and constant supply of excellent water. Two-thirds of the supply would be pure spring water; and the other third, consisting of surface water thoroughly filtered, would improve the hard water, softening it for washing and cooking purposes. The cost of the works was about £5000. The Mayor then opened one of the valves which admitted the water into the first filter-bed. Mr. Hood, in the name of the Engineer (Mr. Dinning), the Contractor (Mr. Carr), and others connected with the works, presented the Mayor with a silver jug as a memento of the interesting ceremony.

Strikes and Lock-outs in 1897.—The general report of Mr. H. Llewellyn Smith, the Commissioner for Labour, on the strikes and lock-outs of 1897, published on Saturday, recalls the fact that last year was much disturbed by trade disputes, the chief of which—the dispute in the engineering trade—entirely overshadowed all the others. Thus, while the aggregate duration of the 864 disputes recorded was about 10 million working days, that of the engineering dispute alone was nearly 6 million days, not including the days lost in the early part of 1898. The total magnitude of the disputes of 1897 had already been exceeded in the first nine months of the present year, the disputes of which, owing to the long-continued and widespread stoppage in the South Wales coal trade, showed an aggregate duration of over 14½ million working days. The total number of workpeople involved in disputes in 1897 was 230,267. This figure was greater than the total for 1896, but less than that for either 1894 or 1895, and only about one-third of the number in 1893.

New Reservoir for Swansea.—Last Thursday, the Mayoress of Swansea (Mrs. Aeron Thomas) performed the ceremony of inaugurating an important scheme of water supply for Swansea by cutting the first turf at the site of the new Cray reservoir. The cost of the entire scheme will be upwards of £300,000; Messrs. Paterson, of Glasgow, having the contract for constructing the reservoir alone for about £250,000. The plans were prepared by Mr. R. H. Wyrill, the Borough Engineer, subject to some alterations in detail by Mr. G. H. Hill, who has now assumed responsibility for carrying out the works. They provide for a reservoir capable of holding 1000 million gallons of water; and when this is added to the 200 million gallons which the present reservoirs hold, it will be seen what a perfect water supply Swansea should possess on the completion of the scheme. The dam will be at the Cray end about 1240 feet long, and 70 feet broad at the foundation, which will be laid in the solid rock (red sandstone); and the dam, which will be of masonry, will be 80 feet above the water-level. In ordinary times the rainfall has been found to be 86·57 inches near the top of the valley, and lower down 63·47 inches, or an average of 70 inches. Indeed, on one day alone the streams above the dam were so flooded that 750 million gallons of water ran over the gauge at the spot where the dam is being constructed.

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Abergavenny Water Supply.—At the invitation of the Chairman of the Water Committee of the Abergavenny District Council (Major Williams), the members recently visited the site of the water-works to inspect the alterations, &c., which have been carried out. Major Williams explained the progress of the works. In 1859, the water was conveyed direct to the town in pipes. In 1886, the old Improvement Commissioners constructed a tank with a capacity of 60,000 gallons; and in 1897 another of like dimensions was commenced, and has now been completed. The work has been carried out by the Surveyor (Mr. J. Haigh) within the estimated expenditure; and the town has now a water supply which may be justly regarded as eminently satisfactory both as to quality and quantity.

Fatal Accident at the Hampton Water-Works.—An inquiry was recently held at Richmond, by Mr. Braxton Hicks, with respect to the death of Robert Bailey, 61, a bricklayer employed at the Hampton Water-Works. Deceased was working on an 8-foot open scaffold when he met with his accident; and the fall could not be accounted for. It was stated to be unusual to protect a scaffold of the above height, or to have it the full length of the work. The Coroner expressed the opinion that the case came under the Factory Act; but Mr. Colson, who represented Messrs. John Aird and Sons, the contractors, said they had always sent notices of accidents to the Board of Trade, and they had never been returned. They were under the impression that the works did not come under the Act. Mr. Frank E. Andrews, superintendent to Messrs. Aird, said they were most anxious to comply with the requirements of the law; but they never before had been held to come under the Factory Act in respect of such works. A verdict of "Accidental death" was returned.

The Abstraction of Water from the Thames.—At the meeting of the Court of Common Council of the City of London last Thursday, Mr. Cox, one of the representatives of the Corporation on the Thames Conservancy, replying to a question, stated that the London Water Companies took 130 million gallons of water from the Thames daily. There was no doubt that, owing to the exceptional drought of the past months, there had been a great drain upon the river. Last month, 125 million gallons of water went over the weir at Teddington daily; but since then there had been plenty of water, and there was no likelihood of any further deficiency in the supply. There was no record since the foundation of the Meteorological Office of such a dry season as during the last three months. He added, that with regard to the purification of the water, the river since 1894 had been divided into three sections, each under the control and supervision of a large staff, who reported periodically to the Conservators. Over 17,000 visitations had been made, and 1145 notices were served upon persons to abate nuisances emanating from their establishments.

Explosion at the Washington Capitol.—According to a report received through Reuter's Agency, an explosion took place last Sunday evening in the Capitol at Washington. It occurred close to the Law Library of the Supreme Court in the Central wing, and it was soon found that a fire had broken out as the result of it. The flames were extinguished, but not before considerable destruction had been wrought. The Library was seriously damaged, and many valuable records filed in the vaults beneath were destroyed. It has been ascertained that the outbreak was caused by an explosion of gas in the basement. A lighted gas-jet is believed to have been blown out in the vault, which was soon filled with gas. This leaked through the cracks, and reached a lighted jet, which caused the explosion. The report received yesterday morning was that the entire central and eastern parts of the building, from the main floor to the sub-basement, were practically in ruins. It is stated that "in the room in which the explosion occurred there was a gasometer [? governor] fed by a 4-inch main. This was wrecked and the escaping gas caught fire." The damage to the building is estimated at $200,000; and the loss of the library and records at over $1,000,000.

Messrs. Jones and Younger, of Chesterfield House, Great Tower Street, have been appointed as the London representatives of Messrs. Bailey and Clapham, of Keighley, the makers of the "A.B.C." acetylene gas generator.

One of Clapham's patent "Eclipse" condensers has recently been put up at the works of the Crystal Palace District Gas Company, Lower Sydenham; and an order for one has just been received for the Bow Common station of The Gaslight and Coke Company.

Messrs. John Wright and Co., Limited, who, as already announced, have lately opened show-rooms at 21, Queen Victoria Street, have issued a new price list of their various appliances for utilizing gas for cooking, warming, and industrial purposes. It is well got up, and contains evidence of the determination of the firm to maintain their already well-established reputation as gas-stove makers.

The Welsbach Incandescent Gas-Light Company, Limited, have issued a revised price list, the first sections of which are devoted to the Company's new burners and mantles and to their new anti-vibration attachment. In the other sections, the "York" and "C" burners, arc lamps, outside shop lanterns, the "Era" petroleum lamp, cups and globes of all kinds, and miscellaneous appliances for use with the incandescent gas system, are fully illustrated.

The Secretary of State for Foreign Affairs has received a dispatch from Her Majesty's Consul-General at Christiania, stating that tenders are invited by the Town Engineer of the port of Stavanger for the delivery of 4800 water and drain pipes of different sizes. Tenders in sealed envelopes, marked "Aubud paa Rör," should be addressed to "Stavanger-Stadsingeniörkontor, Stavanger," where they should be received by Tuesday, the 15th inst. The Foreign Secretary has also received a dispatch from Her Majesty's Consul at Genoa, stating that tenders are invited by the Municipality of Spezia for the supply of 2500 tons of gas coal for the municipal gas-works. Sealed tenders must be received at the Municipality of Spezia by 10 a.m. on the 10th inst. A copy and translation of the conditions of contract may be examined at the Commercial Department of the Foreign Office any day between the hours of eleven in the morning and five in the afternoon.

NOW READY.

Foolscap 4to, pp. 535, with 239 Illustrations and Steel-Plate Engraving (as Frontispiece) of WILLIAM MURDOCH, *Inventor of Gas Lighting. Morocco Gilt, 21s.; Roan Gilt, 18s.*

THE SIXTH (AND CENTENARY) EDITION OF THE

HANDBOOK

FOR

GAS ENGINEERS and MANAGERS.

By THOMAS NEWBIGGING, M.Inst.C.E.

This Edition of the "Handbook for Gas Engineers and Managers" is a great improvement on all previous editions. Much of the text has been re-written, in order to keep the work abreast of the constant advances that are being made in the Gas Industry. About fifty additional Illustrations are given; and a Steel-Plate Engraving of William Murdoch, the Inventor of Gas Lighting.

— *PRINCIPAL CONTENTS.* —

Coal; Chief Kinds of Coal; Analyses of Coals and Cannels; Storage of Coal; Spontaneous Ignition of Coal; Gases Occluded in Coal; Testing of Coal for its Producing Qualities; Gas Production; Retort-House; Inclined or Sloping Retorts; Retort-Stack; Retorts; Retort-Settings; Regenerative System of Heating Retorts; Flues and Draught; Analysis of Furnace Gases; Retort-Bench Mountings; Hydrocarbon and other Gases and Vapours; Retort-House Tools and Appliances; Machine Charging and Drawing; Condensation; Naphthalene; Condensers; Exhausters; Steam Engines and Boilers; Washers; Tower Scrubbers; Washer-Scrubbers; Bye-Pass Mains and Valves; Tar and Liquor Wells and Tanks; Purification; Purifying House; Purifiers; Limestones and Lime Burning; Station Meter and other Indicating and Recording Apparatus; Gasholder Tanks; Gasholders; Governors; Main Pipes; Main Pipe Joints; Wrought-Iron and Steel Main-Pipes; Laying of Main-Pipes; Discharge of Gas through Main-Pipes; Service-Pipes and Fittings; Public Lighting; Consumers' Gas-Meters; Testing-Meters; Internal Fittings; Gas Testing Appliances and Methods; Tests for Impurities; Illuminating Power; The Aerorthometer; Foreign and other (proposed) Home Standards of Light; Jet Photometers; Specific Gravity of Gas; Enrichment of Coal Gas; Public Illuminations; Coloured Fires; Illumination Devices; Use of Gas for Purposes other than Lighting; Residual Products; Coal Tar; Ammoniacal Liquor; Sulphur Recovery; Coal Products; Elementary Substances; Chemical and other Memoranda; The Gas Industry; Cost of Gas-Works; Miscellaneous; Bricks and Brickwork; Mortar and Concrete; Iron, Steel, and other Metals; Velocity and Force of the Wind; Office Memoranda; Epitome of Mensuration; Arithmetical and Algebraical Signs; Multipliers; Table of Diameters, Circumferences, Areas of Circles and Sides of Equal Squares; Weights and Measures; French Weights and Measures—Decimal System; Money Tables.

LONDON: WALTER KING, 11, BOLT COURT, FLEET STREET, E.C.

NOTICE TO ADVERTISERS.—COPY FOR ADVERTISEMENTS for the "JOURNAL" should be received at the Office *not later* than TWELVE O'CLOCK NOON ON MONDAY, to ensure insertion in the following day's issue.

Orders for Alterations in, or Stoppages of, PERMANENT ADVERTISEMENTS should be received not later than the FIRST POST on SATURDAY.

GAS PURIFICATION AND CHEMICAL COMPANY, LIMITED.

OXIDE OF IRON.

O'NEILL'S Oxide has a larger annual sale than all other Oxides combined. Purity and uniformity of quality guaranteed.

JOHN WM. O'NEILL, Managing Director, 160, 161, & 162, PALMERSTON BUILDINGS, OLD BROAD STREET, LONDON, E.C.

ANDREW STEPHENSON, AGENT. All communications re Oxide to the Company as above.

WINKELMANN'S "VOLCANIC" and "VOLCUM" CEMENT. Fire Resistance up to 4500° Fahr. In use in Gas-Works all over the World.

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Offices: Commercial Buildings, LEEDS. Correspondence invited.

JOHN RILEY & SONS, Chemical Manufacturers, Hapton, near Accrington, are MAKERS of SULPHURIC ACID, from Brimstone, for Sulphate of Ammonia Making. Highest percentage of Sulphate of Ammonia obtained from the use of this Vitriol. References given to Gas Companies.

SULPHURIC ACID for Sale.

BROTHERTON AND CO., Chemical Manufacturers. Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

SPECIAL PAINT FOR GAS-WORKS.

JOHN E. WILLIAMS AND CO., VICTORIA PAINT WORKS, MANCHESTER.

Telegrams: "ENAMEL." National Telephone 1769.

GAS TAR wanted.

BROTHERTON AND CO., Tar Distillers. Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

TO GAS AND WATER OFFICIALS.

SPECIALLY favourable terms for Cycles. First-Class Workmanship and Material guaranteed. Art Catalogue post free.

MELROSE CYCLE COMPANY, COVENTRY.

CANNEL, COAL, ETC.

JOHN ROMANS & SON, EDINBURGH, Gas Engineers, supply all the most approved SCOTTISH CANNELS; also FIRE-CLAY GOODS, CAST-IRON PIPES, and other APPARATUS for GAS and WATER WORKS.

Prices, &c., will be forwarded on application to No. 30, ST. ANDREW SQUARE, EDINBURGH, / NEWTON GRANGE, NEWBATTLE, DALKEITH, } SCOTLAND.

HYDRATED OXIDE OF IRON.

PREPARED from pure Iron.

Two or three times as rich as Bog Ore.
Strong action on Sulphuretted Hydrogen.
To be used alone, but will increase activity of other Oxides.
Less than half the price of Bog Ore.
Can be lent on hire.
Write for tabulated results.

READ HOLLIDAY AND SONS, LIMITED, HUDDERSFIELD.

J. & J. BRADDOCK (Branch of Meters Limited), Globe Meter Works, OLDHAM; and 45 & 47, Westminster Bridge Road, LONDON, S.E.

First-Class Award, Melbourne Exhibition, 1889, for WET AND DRY GAS-METERS, STATION METERS, AND GOVERNORS, PRESSURE-GAUGES, STREET LAMPS AND PILLARS, &c.

Telegraphic Addresses: "Braddock, Oldham." "Metrique, London."

SULPHURIC ACID.

JOHN NICHOLSON & SONS, Limited, Chemical Works, Leeds, specially produce this ACID from SULPHUR, for making SULPHATE OF AMMONIA of high quality and *good* colour. Delivery in our own Railway Tank-Wagons or Carboys. Highest references and all particulars supplied on application.

SADLER & CO., Ld., Middlesbrough; ULVERSTON (BARROW); PORTSMOUTH; CARLTON (N.E.R.); and STOCKTON. Tar and Petroleum Distillers. Benzol and Petroleum Spirit, 700 and other Gravities specially prepared for Carburetting. SOLAR OIL for Gas Making, Kerosene, &c.

Correspondence invited.

Telegraphic Address: "SADLER, MIDDLESBROUGH."

IMPORTANT.

REPAIR your old Retorts with Patent STICKFAST FIRE CEMENT. Unequalled for Repairing Inclines. Estimates for all kinds of Retort-Settings.

Write CROWTHER, Retort Setter, and Sole Maker of Stickfast Fire Cement, Manor Street, HUDDERSFIELD.

PATENTS FOR INVENTIONS.

J. C. CHAPMAN, M.I.M.E., and Fel. Chartered Inst. Patent Agents. ADVICE ON ALL MATTERS CONNECTED WITH ABOVE. Information and Handbook on application.

70, CHANCERY LANE, LONDON, W.C.

AMMONIACAL LIQUOR wanted.

BROTHERTON AND CO., Ammonia Distillers. Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

GAS CARBON Wanted, not less than 4-Ton Loads.

Apply to the BRIMINGTON CARBON COMPANY, Sowerby Bridge, YORKS.

SULPHATE OF AMMONIA SATURATORS.

JOSEPH TAYLOR & CO., Chemical Plumbers, &c., and Makers of every description of Solid Plate Lead and Timber Cased Saturators, &c., CENTRAL PLUMBING WORKS, TOWN HALL SQUARE, BOLTON. Special attention to Repairs.

Before placing Orders, please write for Estimate.

Telegraphic Address: "SATURATORS, BOLTON."

ECONOMY IN PURIFICATION.

INCREASE the efficiency of your PURIFIERS by adopting CRIPPS'S PATENT BYE-PASS VALVE in the lower Tiers of Sieves. Practical Experience proves their Economy. Engineers are repeating orders after thorough trial.

References and Particulars can be obtained from the Makers—

C. & W. WALKER, Midland Iron-Works, Donnington, near Newport, SALOP.

WANTED, Carbon in 4 Ton Lots, or more; also OIL CARBON.

State Price, f.o.r. at nearest Station, to No. 3031, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

GAS PURIFICATION.

OXIDE OF IRON BOG ORE.

BALE & CO.'S Oxide of uniform quality. SPECIAL FIRE CEMENT, OXIDE PAINTS, OILS, SULPHURIC ACID, &c.

120 and 121, NEWGATE STREET, LONDON, E.C.

Telegrams: "BOGORE, LONDON."

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BROTHERTON AND CO., Chemical Manufacturers. Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

PORTER & CO., Gowts Bridge Works, LINCOLN, Engineers, Ironfounders, and Contractors for the erection of Gas-Works for Towns, Villages, Mansions, Manufactories, Collieries, and Isolated Buildings at home and abroad. Manufacturers of Retorts and Fittings, Condensers, Scrubbers, Purifiers, Valves, &c.; also of Girders, Wrought and Cast Iron Tanks, Iron Roofs, &c.

Telegraphic Address: "PORTER LINCOLN."

[For Illustrated Advertisement, see Nov. 1, p. 998.]

THE Directors of the Company recently advertising in the "JOURNAL OF GAS LIGHTING" for a Sub-Manager (Advertisement No. 3132) TENDER THEIR THANKS to the several Gentlemen applying for the Situation, which has now been filled up.

NOV. 3, 1898.

ROTHERHAM CORPORATION GAS DEPARTMENT.

WANTED, Stokers for above Works. Regular employment to suitable Men.

Apply to F. A. WINSTANLEY, Engineer and Manager.

WANTED, at once, two Stokers used to Shovel Charging, Engine and Exhauster. None but steady, industrious Men need apply. Wages 30s. per week. A permanent job for good Men.

Apply to S. BARK, Gas-Works, SUNBURY.

WANTED, in a Provincial Gas-Works, a Young Man as junior DRAUGHTSMAN and ANALYST. Commencing Salary £65 per annum.

Apply, stating Age and Experience, to No. 3156, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

PUPIL.

ENGINEER on a large modern Gas-Works in a healthy Northern Town has a Vacancy for a PUPIL. Premium required.

Apply, by letter, to No. 3157, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

DRAUGHTSMAN wanted in Contractors' Office in the North of England. Accustomed to designing and detailing Gas-Works Apparatus.

Apply, stating Age, Terms, and References, to No. 3158, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

MAIN and Service Layer wanted. Permanent Job to a really good Workman, who is willing to make himself generally useful on the Works.

Apply, by letter, stating Age, whether Married or Single, and Wages required, and enclosing *copies only* of Testimonials, to No. 3146, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

GAS STOKER.

WANTED, a Man as Stoker and to assist Works Manager generally. Will be required to undertake Night Work alternate Fortnights. Also to attend to Exhauster Engine. Wages 22s. per week.

Apply to E. ALLEN, Secretary, Epping Gas Company, Limited, EPPING.

GWYNNE & BEALE'S

PATENT

GAS-EXHAUSTERS AND STEAM-ENGINES

FOR FULL PARTICULARS, APPLY TO THE MAKERS:

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Telegrams: "GWYNNEGRAM, LONDON."

HYDRAULIC AND GAS ENGINEERS

Telephone No. 95 Holborn.

(Late Essex Street Works, Victoria Embankment, London),

BROOKE STREET WORKS, HOLBORN, LONDON, E.C.

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WANTED, Samples and Prices of SULPHUR in fine Powder, recovered from Spent Oxide.

Address No. 3155, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

YOUTH to learn Office and Works routine, required by the Secretary and Manager of a Gas Company in the West of England. No premium required; but time must be given.

Apply, by letter, to No. 3159, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, a competent Man to take charge of Buying and Sales Departments in large Gas-Fittings Business. Thorough and personal knowledge of Home (especially Birmingham) and Foreign Gas Fittings, Chandelier, and Glass Trade. Experience in Incandescent Gas Lighting essential. Good Correspondent.

Apply, by letter, to No. 3160, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

SHEFFIELD UNITED GASLIGHT COMPANY.

WORKS SUPERINTENDENT.

WANTED, by the Directors of this Company, an experienced and competent man to act as SUPERINTENDENT at their Neepsend Gas-Works. Preference will be given to one who has been used to Regenerative Furnaces and Mechanical Stokers. He will be provided with a House near the Works, and with Coal and Gas free.

The Maximum Make of Gas at this Station is about 7¾ million cubic feet per day.

Applications (marked "Superintendent"), stating Age, previous Engagements, and Salary required, to be made, by letter only, addressed to Sir Fredk. T. Mappin, Bart., M.P., Chairman of the Company, Gas Offices, Sheffield, not later than Saturday, the 19th inst.

HANBURY THOMAS,
General Manager and Secretary.

Commercial Street, Sheffield,
Nov. 4, 1898.

FOR SALE—A Single-Lift Gasholder in Brick Tank, about 20 feet diameter by 13 feet, with Four Cast-Iron Columns, in good condition, at the Gas-Works, Whitchurch, Hants. Purchaser to take down and remove.

Offers to be sent to the SECRETARY, Whitchurch and District (Hants) Gas Company, Limited, 46, Cannon Street, LONDON, E.C.

GAS PLANT for Sale—I can always offer NEW and SECOND-HAND GAS APPARATUS, including Retorts and Fittings, Condensers, Exhausters, Scrubbers, Washers, Purifiers, Gasholders, Tanks, Valves, Connections, &c. Also a few COMPLETE WORKS. **Compare Prices and Particulars before ordering elsewhere.**

J. F. BLAKELEY, Gas Engineer, Ravensthorpe, YORKS.

THE Directors of the Newmarket Gas Company invite TENDERS for the surplus TAR produced at their Works from the 1st of October, 1898, to the 31st of March, 1899.

Tenders, stating price per 1000 gallons, delivered into Contractor's Tanks free on Rail at Newmarket Station, to be sent on or before the 14th inst. to the undersigned, from whom any further particulars may be obtained.

The Directors do not bind themselves to accept the highest or any Tender.

By order,
J. H. TROUGHTON,
Manager and Secretary.

Gas-Works, Newmarket,
Nov. 5, 1898.

CORPORATION OF LEICESTER.

RETORTS AND FIRE-BRICKS.

THE Gas and Electric Lighting Com- mittee of the above Corporation are prepared to receive TENDERS for the supply and delivery of RETORTS and FIRE-BRICKS.

Specification, Quantities, and Form of Tender can be obtained from the Engineer.

Tenders, addressed to Alderman Lennard, Chairman, and endorsed "Tender for Retorts, &c.," to be delivered at these Offices not later than Eleven o'clock a.m., on Saturday, Nov. 19, 1898.

The Committee do not bind themselves to accept the lowest or any Tender.

ALFRED COLSON, M.Inst.C.E.,
Engineer and Manager.

Offices: Millstone Lane,
Leicester, Nov. 3, 1898.

SOUTHAMPTON GASLIGHT AND COKE COMPANY.

ISSUE OF £10,000 5 PER CENT. ORDINARY STOCK.

SALE BY TENDER—MINIMUM PRICE £115 PER CENT.

THE Directors invite Tenders for £10,000 of ORDINARY STOCK, authorized to be raised under the Southampton Gas Act, 1898, entitled to a Maximum Dividend at the rate of Five Pounds per cent. per annum, payable half-yearly (subject to Income-Tax). Allotments to the highest bidders.

Tenders must be delivered on or before Tuesday, the 15th of November, 1898.

Forms of Tender, with Particulars and Conditions, may be obtained on application to the SECRETARY, at the Company's Offices, Ogle Road, SOUTHAMPTON, or from the Company's Bankers, Messrs. GRANT and MADDISON'S UNION BANKING COMPANY, LIMITED, SOUTHAMPTON, or from Messrs. LLOYD'S BANK, LIMITED, Lombard Street, LONDON.

By order of the Directors,
C. CROWTHER SMITH,
Secretary.

Southampton, Nov. 2, 1898.

SALES BY AUCTION OF GAS AND WATER STOCKS AND SHARES.

MR. ALFRED RICHARDS begs to notify that his AUCTIONS of STOCKS and SHARES in London, Suburban, and Provincial Gas and Water Companies are held MONTHLY, at the Mart, Tokenhouse Yard, E.C.

He also undertakes the issuing by Auction of Gas and Water Stocks and Shares under Parliamentary Powers.

Terms for issuing such Capital, and also for including Gas and Water Stocks and Shares in these periodical Sales, can be obtained on application at Mr. Alfred Richards's Offices, 18, FINSBURY CIRCUS, E.C.

By order of the Directors of the
BRENTFORD GAS COMPANY.

£15,000 OF NEW STOCK 1881.

Ranking for a Standard Dividend of 7 per cent. per annum, subject to the Sliding-Scale; the last Dividend on similar Stock having been at the rate of 9 per cent.

MR. ALFRED RICHARDS will Sell THE ABOVE BY AUCTION, at the Mart, Tokenhouse Yard, E.C., on Wednesday, Nov. 23, at Two o'clock precisely, in Lots.

Particulars may be obtained of the SECRETARY of the Company, at the Offices, BRENTFORD; and of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

By order of Trustees.

IMPORTANT SALE OF NEW SHARES IN THE NEW RIVER COMPANY.

MR. ALFRED RICHARDS will Sell BY AUCTION, at the Mart, Tokenhouse Yard, E.C., on Tuesday, Nov. 15, 1898, at Two o'clock precisely, in Lots,

63 £100 NEW SHARES (FULLY PAID) IN THE NEW RIVER COMPANY.

Ranking for Dividend equally with the "Adventurers'" and "King's" Shares, the last Dividend having been 13½ per cent.

The salient features of an investment in the New Shares, one of the best paying of the Company's Stocks, are that the Dividend is unlimited and rapidly rising; the revenue is steadily increasing, having more than doubled since 1867; rack rentals of the Company's principal London Estate commence to fall into reversion in 1903; the water supply is ample and admittedly of the highest purity; the district is 92½ square miles in extent, less than half being at present supplied.

Full Particulars of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

GAS STOCKS AND SHARES
IN THE
LEA BRIDGE DISTRICT GAS COMPANY, TOTTENHAM AND EDMONTON GAS COMPANY, ROMFORD GAS COMPANY, LIMITED, & ENFIELD GAS COMPANY.

MR. ALFRED RICHARDS will Sell the above BY AUCTION, at the Mart, E.C., on Tuesday, Nov. 15, at Two o'clock, in Lots.

Particulars of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

By order of the Directors of the
SOUTHEND GAS COMPANY.

NEW ISSUE OF £13,500 FIVE PER CENT. STOCK.

Ranking for a Standard Dividend of 5 per cent. subject to the Sliding Scale; but in view of the Dividends paid in June last entitled to pay 5½ per cent.

MR. ALFRED RICHARDS will Sell THE ABOVE BY AUCTION, at the Mart, E.C., on Tuesday, Nov. 29, at Two o'clock, in Lots.

Particulars at the Company's Offices, SOUTHEND; and of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

ORIENTAL GAS COMPANY, LIMITED.

NOTICE is Hereby Given, that the ORDINARY GENERAL MEETING of the Shareholders of this Company will be held at the Offices of the Company, Finsbury House, Blomfield Street, London, E.C., on Wednesday, the 16th day of November, 1898, at Twelve o'clock noon precisely.

The Directors who retire are Messieurs J. Blacket Gill and H. D. Ellis. The Auditors, Messieurs S. W. Savage and W. Williams, also retire. All are eligible for re-election, and offer themselves accordingly.

By order of the Board,
H. J. LUFF,
Secretary.

Finsbury House, Blomfield Street,
London, E.C., Nov. 2, 1898.

N.B.—The Transfer Books will be closed from the 10th to the 30th of November, both inclusive.

GEORGE A. CHAPMAN.
STOCK AND SHARE DEALER,
51, MOORGATE STREET, LONDON, E.C.

SHARES ON SALE—£400 Northfleet and GREENHITHE GAS COMPANY'S STOCK; £700 of the 4 per cent. DEBENTURE BONDS in the HENLEY-ON-THAMES WATER COMPANY, Limited; a few SHARES in the WESTERHAM GAS AND COKE COMPANY; 20 £10 fully-paid, 7 per cent. "B" SHARES in the HORSHAM GAS COMPANY, Limited, and 15 £10 fully-paid "A" SHARES in the same Company; 100 ORDINARY and 80 PREFERENCE SHARES in METERS LIMITED.

WANTED, SHARES in METERS LIMITED, Ordinary and Preference, and also SHARES in GAS and WATER COMPANIES.

ALL CLASSES OF GAS AND WATER SHARES DEALT IN.

IMPERIAL CONTINENTAL GAS ASSOCIATION.
(INCORPORATED BY ACT OF PARLIAMENT.)

NOTICE is Hereby Given, that the HALF-YEARLY ORDINARY GENERAL MEETING of the Proprietors of this Association was held at the City Terminus Hotel, Cannon Street, London, on Tuesday, the 1st inst.,

THOMAS HENRY GOODWIN NEWTON, Esq., in the Chair, when the following RESOLUTIONS were unanimously passed:—

"That the Report of the Directors upon the affairs of the Association be received, adopted, and entered upon the Minutes."

"That a Dividend of 5 per cent. for the Half Year ended the 30th of June last be declared upon the £3,800,000 Capital Stock of the Association, and that the same be payable, free of Income-Tax, on and after the 8th of November next."

Cordial Votes of Thanks were passed to the Directors for their able management of the affairs of the Association, to the Chairman for his conduct in the Chair and to the staff in London and on the Continent.

By order of the Board,
ROBERT W. WILSON,
Secretary.

21, Austin Friars, London, E.C.,
Nov. 2, 1898.

SUNDERLAND AND SOUTH SHIELDS WATER COMPANY.

IMPORTANT SALE OF WATER STOCK.

TO BE SOLD, by Auction, in the Long Room of the Queen's Hotel, Fawcett Street, Sunderland, on Wednesday, Nov. 23, 1898, at Half-past Three o'clock in the Afternoon,

Mr. ATKINSON GIBSON, Auctioneer,

£25,000

(Nominal) of the New Stock (Maximum Dividend 5 per cent.) authorized to be created and issued under the Powers contained in the Sunderland and South Shields Water Act, 1891.

The above Stock will be entitled to Dividend from the 1st day of January, 1899, and be registered in the name of the Purchaser free of charge.

A Deposit of 10 per cent. will be required at the time of Sale; the remainder to be paid on or before the 3rd day of January, 1899.

Price 6s., Cloth Bound,

THE CHEMISTRY OF ILLUMINATING GAS.

By N. H. HUMPHRYS, Assoc.M.Inst.C.E., F.C.S.

This work contains chapters on: The Relative Cost of Light from Gas, Oil, and Candles; Products of Combustion; The Sulphur Question; The Composition of Illuminating Gas; Water Gas; Various Gas-Making Processes; Oil Gas; Properties of Fluid Hydrocarbons; Tar for Gas-Making; Destructive Distillation; Condensation; and Purification.

LONDON: Walter King, 11, Bolt Court, Fleet St., E.C.

Now Ready, Crown 4to., Price 3s. 6d.

GASHOLDER AND TANK

(Of One Million Cubic Feet Capacity)
AT THE
SUTTON GAS-WORKS.

Designed and carried out by

F. SOUTHWELL CRIPPS, Assoc.M.Inst.C.E.

MEMBER OF THE INSTITUTION OF GAS ENGINEERS,
MEMBER OF THE SOCIETY OF ARTS,
CONSULTING ENGINEER.

EMBRACING NOTES ON GASHOLDER CONSTRUCTION GENERALLY.

REPRINT OF A SERIES OF ARTICLES IN THE "JOURNAL OF GAS LIGHTING," &C., WITH THE ACCOMPANYING PLATES.

Other Works by the same Author.

The Guide-Framing of Gasholders, and Strains on other Structures in Gas-Works	**6s. 0d.**
Gasholders With or Without Guide-Framing: A Discussion; and Literature on Gasholder Construction	**1s. 0d.**
Flow of Gas, and Proportioning Gas-Mains	**7s. 6d.**

PUBLISHED BY
WALTER KING, 11, BOLT COURT, FLEET STREET, E.C.

THOMAS DUXBURY & CO.,
16, DEANSGATE, MANCHESTER.
GAS ENGINEERS' AGENTS AND CONTRACTORS FOR
Meters, Fire-Clay Goods, Oxide of Iron, and all other Gas Apparatus. Retort Carbon purchased.
Inquiries Solicited.
Telegrams: "DARWINIAN, MANCHESTER." Telephone 1806.

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The Meter Life Book specially adapted, and revised for "Slot" Meter Registration by

ROBERT P. KEYS.

In sizes to record 1000 Meters, with Index, Half Bound	.. ..	£2	2 0
To record 500 Meters	.. ..	£1	15 0
To record 250 Meters	.. ..	£1	11 6

The only Easy System yet projected.

PUBLISHED BY

WALTER KING, 11, Bolt Court, Fleet Street, E.C.

THE Acetylene Illuminating Company, Limited, 63, Queen Victoria Street, London, E.C., GIVE NOTICE that they hold the BRITISH PATENT RIGHTS for the MANUFACTURE OF CALCIUM CARBIDE by means of the electric furnace, that they are bringing an action against the Midland Acetylene (Parent) Syndicate, Limited, to restrain them from so manufacturing that product, and that they intend in the future to bring actions against all infringers of these Patents and all purchasers or users of Carbide of Calcium made in infringement of the same.

NOTICE.

THE Acetylene Illuminating Company, Limited, having published and issued an advertisement or circular claiming that they hold the British Patents for the Manufacture of Calcium Carbide by means of the Electric Furnace, we guarantee to indemnify anyone who buys Carbide from us against any claim by "The Acetylene Illuminating Company, Limited," or anyone else.

READ HOLLIDAY AND SONS, LIMITED, Acetylene Gas Engineers and Carbide of Calcium Manufacturers, HUDDERSFIELD.

NOTICE.

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CHEAP BENZOL.

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Incandescent Burners from **5/6 per doz.**

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All other Incandescent Fittings at greatly reduced Prices.

Best "Comet" Bulbs, 3s. per Dozen.

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BOLDON GAS COALS.

ANALYSIS.

Yield of Gas per ton	10,500	Cubic Feet.
Illuminating Power	16·9	Candles.
Coke	66·7	Coke.
Sulphur	0·86	Sulphur.
Ash	2·04	Ash.

For Prices, &c., apply to

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NOTE.—Makers of HORSLEY'S PATENT SYPHONS. These are cast in one piece, without Chaplets; doing away with Bolts, Nuts and Covers, and rendering Leakage impossible.

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Available output up to 5000 tons per day.
Yield of Gas 11,000 cubic feet per ton of Coal as per analysis by
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GAS COALS.

Present Daily Produce over 5000 Tons.

Latest Analysis—By CHARLES PHILLIPS, Gas Examiner to Rotherham Corporation

Yield of Gas per Ton	11,205 Cubic Feet.
Illuminating Power	16 1/10 Stand. Sperm. Candl.
Coke (of good & pure quality)	13¾ Cwt. per Ton.
Sulphur	A little over 1 per Cent.
Ash	Under 1 per Cent.
Tar	163 lbs. (Avoir.) per Ton.
Ammoniacal Liquor	103 lbs. (Avoir.) per Ton.

HOLMSIDE GAS COALS are supplied to the largest Gas Companies in England and on the European Continent; London alone consuming about half the produce.

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Yield of Gas per ton	10,500 cub. ft.
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Illuminating Power	38·22 candles
Coke per ton	1,301·88 lbs.

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Yield of Gas per ton	10,500 cub. ft.
Illuminating Power	17·8 candles.
Coke	70 per cent.

SOUTH PELAW MAIN GAS COAL.

Yield of Gas per ton	10,500 cub. ft.
Illuminating Power	16·3 candles.
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Maintains a High Standard in Residuals.
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RECOVERY OF SULPHUR,
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OUT OF THEIR
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Analysis made by
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Illuminating Power	16·9 Candles.
Coke (of good quality)	67·5 per Cent.
Sulphur	0·58 „
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FOR WHOLESALE AND EXPORT TRADE ONLY.
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Incandescent Mantles, transportable	per 100	£1 15s. 0d.
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1. Smooth interior, preventing adhesion of Carbon.
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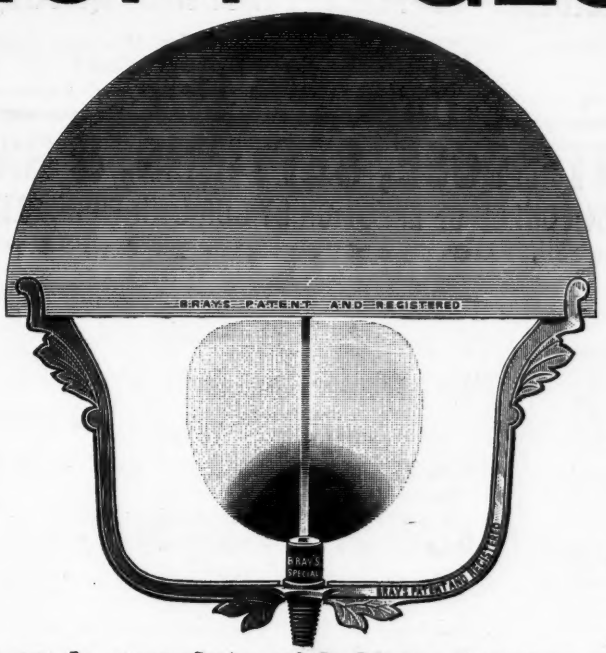
They do not dirty Ceilings or get Black themselves, and preserve Decorations from Smoke.

Save in White-Washing and Decorations alone more than will pay the Gas Bill, and keep the House bright and clean.



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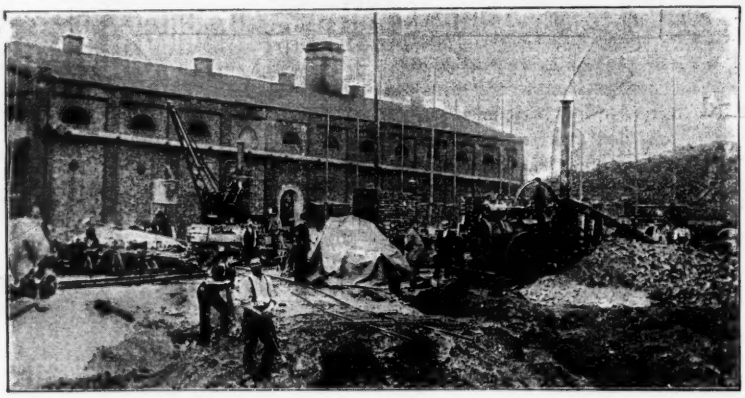

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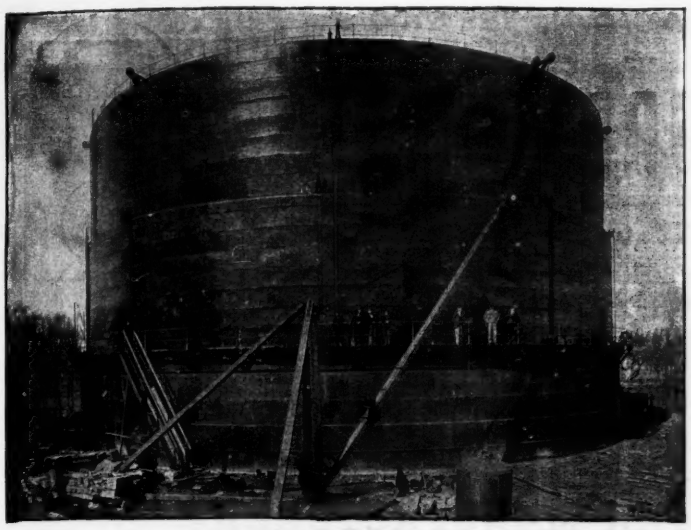

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BARCELONA	99 ft. by 26 ft.,	2 ,,
MALVERN	120 ft. by 23 ft.,	2 ,,
BUCHAREST	87 ft. by 21½ ft.,	2 ,,
SVENDBORG	46 ft. by 19 ft.,	2 ,,
VALPARAISO	80 ft. by 24 ft.,	2 ,,
FALMOUTH	50 ft. by 26 ft.,	2 ,,
TRURO	62 ft. by 21 ft.,	2 ,,
BIRMINGHAM	80 ft. by 20 ft.,	1 ,,
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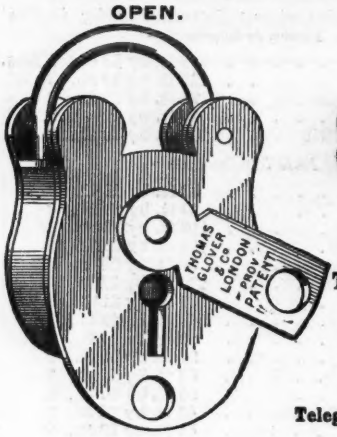

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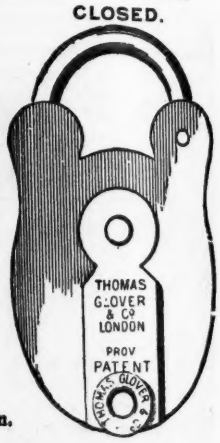

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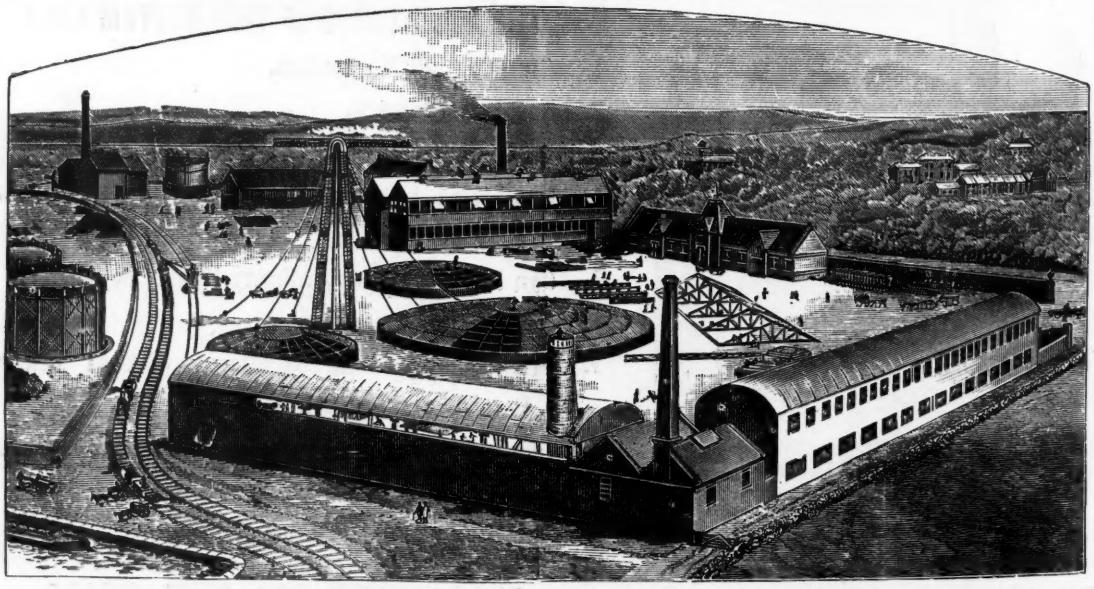

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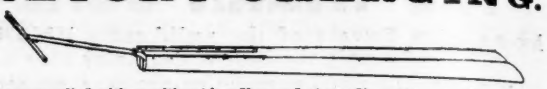

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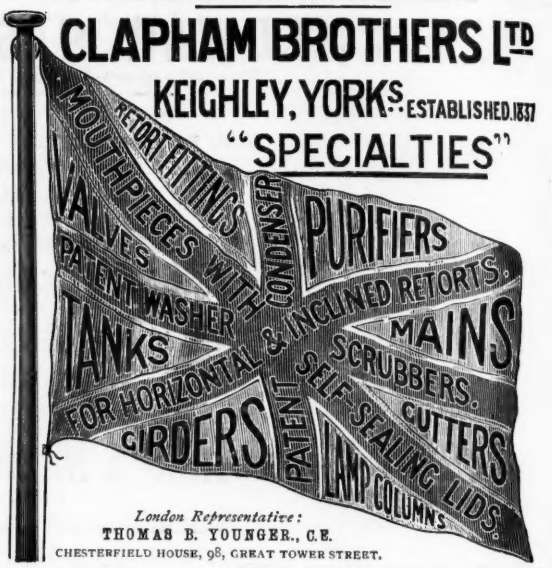

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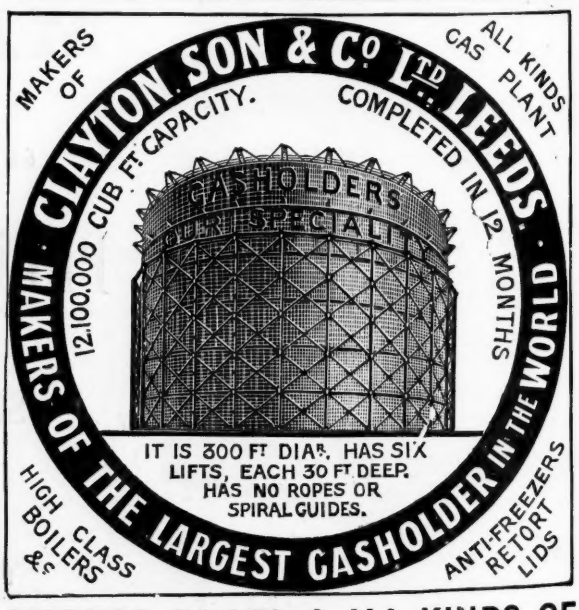
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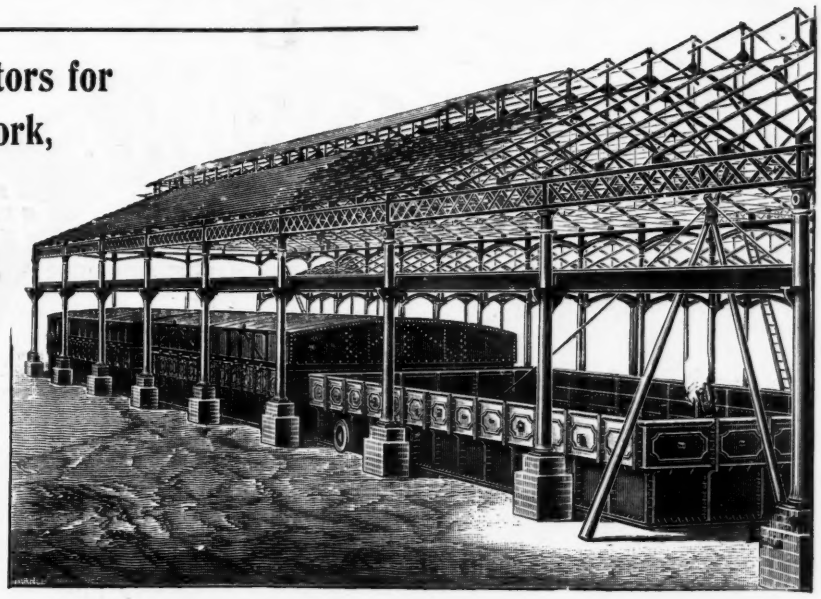

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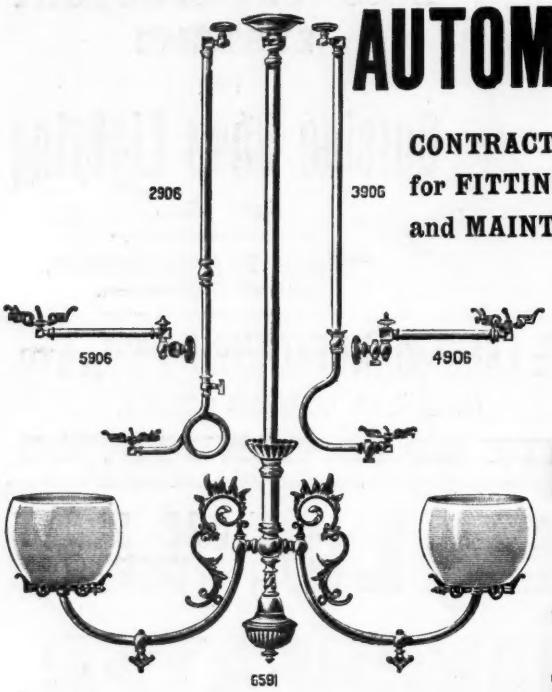

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